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Part 12

INTEGRATED INFORMATION SUPPORT SYSTEM (IISS)
Volume VIII - User Interface Subsystem
Part 12 - Virtual Terminal Product Specification

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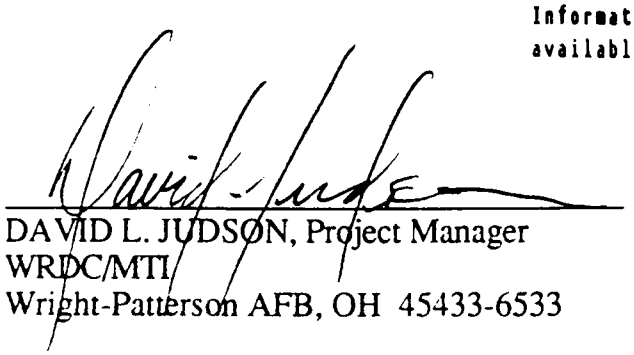

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This specification establishes the detailed design of the Virtual Terminal computer program.

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FOREWORD

This technical report covers work performed under Air Force Contract F33600-87-C-0464, DAPro Project. This contract is sponsored by the Manufacturing Technology Directorate, Air Force Systems Command, Wright-Patterson Air Force Base, Ohio. It was administered under the technical direction of Mr. Bruce A. Rasmussen, Branch Chief, Integration Technology Division, Manufacturing Technology Directorate, through Mr. David L. Judson, Project Manager. The Prime Contractor was Integration Technology Services, Software Programs Division, of the Control Data Corporation, Dayton, Ohio, under the direction of Mr. W. A. Osborne. The DAPro Project Manager for Control Data Corporation was Mr. Jimmy P. Maxwell.

The DAPro project was created to continue the development, test, and demonstration of the Integrated Information Support System (IISS). The IISS technology work comprises enhancements to IISS software and the establishment and operation of IISS test bed hardware and communications for developers and users.

The following list names the Control Data Corporation subcontractors and their contributing activities:

SUBCONTRACTOR	ROLE
Control Data Corporation	Responsible for the overall Data Model design development and implementation, IISS integration and test, and technology transfer of IISS.
D. Appleton Company	Responsible for providing software information services for the Common Data Model and IDEF1X integration methodology.
ONTEK	Responsible for defining and testing a representative integrated system base in Artificial Intelligence techniques to establish fitness for use.
Simpact Corporation	Responsible for Communication development.
Structural Dynamics Research Corporation	Responsible for User Interfaces, Virtual Terminal Interface, and Network Transaction Manager design, development, implementation, and support.
Arizona State University	Responsible for test bed operations and support.

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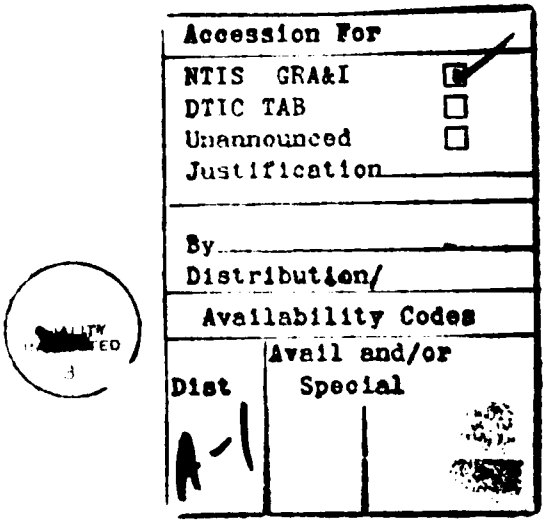

LIST OF ILLUSTRATIONS

SECTION 1

SCOPE

1.1 Identification

This specification establishes the detailed design of a computer program identified as the Virtual Terminal, hereinafter referred to as the VT. The VT is one configuration item of the Integrated Information Support System (IISS) User Interface (UI).

1.2 Functional Summary

One of the objectives of the IISS testbed is to allow applications to be run from a wide variety of terminals. Instead of the application programmer having to worry about what commands to send to which type of terminal to perform what functions, he just uses commands for the Virtual Terminal. The Virtual Terminal is defined just like a real terminal; it has a set of functions which it can perform, a set of attributes that it supports, a set of commands for invoking the functions, and modes of operation.

The VT translates between the Virtual Terminal commands and commands for the particular type of terminal a user has. This process is not as simple as it sounds since no single terminal provides all of the functions and attributes that the Virtual Terminal does. Thus, the Virutal Terminal Interface must simulate missing functions with existing ones.

In addition to supporting real terminals, the VT also performs another function -- interfacing existing applications to the testbed. An existing application sends (and expects to receive) commands for a particular type of terminal. In the testbed these commands are intercepted and sent to the Virtual Terminal which then converts the commands into Virtual Terminal commands, just as if they had been entered from a real terminal. Of couse, it also converts Virtual Terminal commands to the specific terminal commands the application expects to receive. The Virtual Terminal allows an application to be run from a terminal other than the one it was designed for.

[11] Structural Dynamics Research Corporation, Virtual Terminal Unit Test Plan, UTP620144300 , 1 November 1985.

2.2 Terms and Abbreviations

American Standard Code for Information Interchange: (ASCII), the character set defined by ANSI X3.4 and used by most computer vendors.

Application Interface: (AI), subset of the IISS User Interface that consists of the callable routines that are linked with applications that use the Form Processor or Virtual Terminal. The AI enables applications to be hosted on computers other than the host of the User Interface.

Application Process: (AP), a cohesive unit of software that can be initiated as a unit to perform some function or functions.

Attribute: field characteristic such as blinking, highlighted, black, etc. and various other combinations. Background attributes are defined for forms or windows only. Foreground attributes are defined for items. Attributes may be permanent, i.e., they remain the same unless changed by the application program, or they may be temporary, i.e., they remain in effect until the window is redisplayed.

Communication Services: allows on host interprocess communication and inter-host communication between the various Test Bed subsystems.

Computer Program Configuration Item: (CPCI), an aggregation of computer programs or any of their discrete portions, which satisfies an end-use function.

Device Drivers: (DD), software modules written to handle I/O for a specific kind of terminal. The modules map terminal specific commands and data to a neutral format. Device Drivers are part of the UI Virtual Terminal.

Extended Binary Coded Decimal Interchange Code: (EBCDIC), the character set used by a few computer vendors (notably IBM) instead of ASCII.

Field: two dimensional space on a terminal screen.

SECTION 2

DOCUMENTS

2.1 Reference Documents

[1] Structural Dynamics Research Corporation, Application Interface Product Specification, PS 620144700 , 1 November 1985.

[2] Structural Dynamics Research Corporation, Forms Driven Form Editor Product Specification, PS 620144402 , 1 November 1985.

[3] Structural Dynamics Research Corporation, Forms Language Compiler Product Specification, PS 620144401 , 1 November 1985.

[4] Structural Dynamics Research Corporation, Form Processor Product Specification, PS 620144200 , 1 November 1985.

[5] Structural Dynamics Research Corporation, Rapid Application Generator Product Specification, PS 620144502 , 1 November 1985.

[6] Structural Dynamics Research Corporation, Report Writer Product Specification, PS 620144501 , 1 November 1985.

[7] Structural Dynamics Research Corporation, Text Editor Product Specification, PS 620144600 , 1 November 1985.

[8] Structural Dynamics Research Corporation, User Interface Services Product Specification, PS 620144100 , 1 November 1985.

[9] Structural Dynamics Research Corporation, Virtual Terminal Development Specification, DS 620144300B, 1 November 1985.

[10] Structural Dynamics Research Corporation, Virtual Terminal User Manual, UM 620144300B, 1 November 1985.

Integrated Information Support System: (IISS), a test computing environment used to investigate, demonstrate and test the concepts of information management and information integration in the context of Aerospace Manufacturing. The IISS addresses the problems of integration of data resident on heterogeneous data bases supported by heterogeneous computers interconnected via a Local Area Network.

Logical Device: a conceptual device which to an application is indistinguishable from a physical device and is then mapped to part or all of a physical device.

Network Transaction Manager: (NTM), IISS subsystem that performs the coordination, communication and housekeeping functions required to integrate the Application Processes and System Services resident on the various hosts into a cohesive system.

Operating System: (OS), software supplied with a computer which allows it to supervise its own operations and manage access to hardware facilities such as memory and peripherals.

Physical Device: a hardware terminal.

User Interface: (UI), IISS subsystem that controls the user's terminal and interfaces with the rest of the system. The UI consists of two major subsystems: the User Interface Development System (UIDS) and the User Interface Management System (UIMS).

User Interface Management System: (UIMS), the runtime UI. It consists of the Form Processor, Virtual Terminal, Application Interface, the User Interface Services and the Text Editor.

User Interface Monitor: (UIM), part of the Form Processor that handles messaging between the NTM and the UI. It also provides authorization checks and initiates applications.

User Interface/Virtual Terminal Interface: (UI/VTI), another name for the User Interface.

Virtual Terminal: (VT), subset of the IISS User Interface that performs the interfacing between different terminals and the UI. This is done by defining a specific set of terminal features and protocols which must be supported by the UI software which constitutes the virtual terminal definition. Specific terminals are then mapped against the virtual terminal software by specific software modules written for each type of real terminal supported.

Virtual Terminal Interface: (VTI), the callable interface to the VT.

Window: dynamic area of a terminal screen on which predefined forms may be placed at run time.

Window Manager: a facility which allows the following to be manipulated: size and location of windows, the device on which an application is running, the position of a form within a window. It is part of the Form Processor.

SECTION 3

REQUIREMENTS

3.1 Structural Description

Figure 3-1 describes the structure of the Virtual Terminal. The Virtual Terminal consists of some routines that are linked with the application that uses it (VT Application Monitor) as well as a process that performs monitoring, window management activities and translation of VT commands into commands for a specific device.

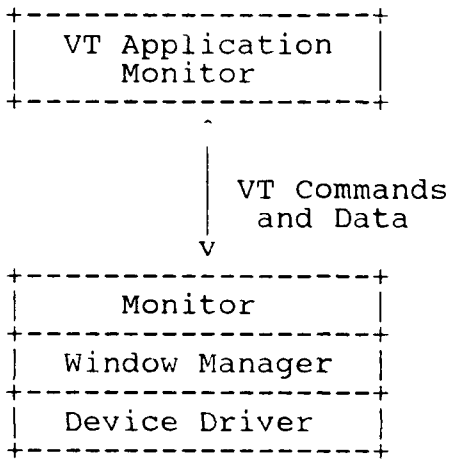

Figure 3-1 Virtual Terminal Structure

3.2 Functional Flow

The Virtual Terminal can be used in two different modes: master and slave. Currently, the master mode is used for interactive devices and the slave mode is used for batch devices such as printers.

Figure 3-2 is a data flow for the Virtual Terminal in master and slave mode.

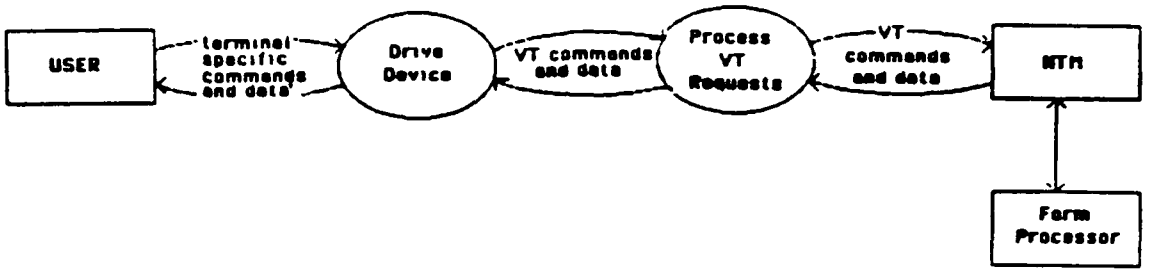

Figure 3-2 Virtual Terminal Data Flow

3.3 Interfaces

3.3.1 Physical Terminal

The interface to a physical terminal is a function of the host Operating System (OS) and is highly system dependent. When somewhat portable functions are recognized, they are isolated into system independent routines thus making as much of the code portable as is possible.

3.3.2 Application

Applications can use the VT Application Monitor to communicate with the VT process. The types of messages that are sent to and from the VT process are dependent upon the mode (master or slave) of the VT process and are described in the next two sections. Device data messages (type DD) contain VT commands and data. The VT commands are described in Appendix A of the Virtual Terminal Development Specification (DS 620344300).

3.3.2.1 VT Process as Master

RECEIVE MESSAGES

Message Type	Action Taken/Buffer
SD	Terminates Device Driver.
DD	Send Device Data to be output to Virtual Terminal.
DQ	Send Device Data to be output to Virtual Terminal and request for acknowledgement.

SEND MESSAGES

Message Type	Action Taken/Buffer
DE	Informs UIM that Master Device Driver is entering the UIM system control.
DD	Send Device Data which was input to Virtual Terminal.

Section 3.2.2.1.2 of the Virtual Terminal Development Specification contains a detailed description of these messages.

3.3.2.2 VT Process as Slave

RECEIVE MESSAGES

Message Type	Action Taken/Buffer
DE	Starts up Slave Device Driver.
SD	Terminates Device Driver.
DD	Send Device Data to be output to Virtual Terminal.

SEND MESSAGES

Message Type	Action Taken/Buffer
DI	Informs UIM that slave driver is alive and should be initialized with proper size.
DD	Send Device Data which was input to Virtual Terminal.

Section 3.2.2.2.2 of the Virtual Terminal Development Specification contains a detailed description of these messages.

3.3.3 Terminal User

When the VT process is the master it is started by the terminal user. It has a number of parameters that can be used if scripting is required.

-w <scripting file name>	- write script file
-r <scripting file name>	- read script file
-s <save file name>	- saves output from session

These arguments are optional. The user can either create a script file, read a script file, or do neither. The user can also save or not save the output from a session.

3.4 Program Interrupts

Attention interrupts received from the terminal (CNTL/C, break) cause the VT process to terminate by calling the NTM routine TRMNAT.

3.5 Timing and Sequencing Description

The Monitor processes two types of input: keyboard characters and NTM messages. First, a check is made for available keyboard characters. As long as characters are available, they are processed. When no characters are available, a check is made for NTM messages. If a message is found, it is processed and the Monitor again checks for keyboard characters. If no message is available, the Monitor waits for approximately .1 seconds before again checking for keyboard characters.

3.6 Special Control Features

The detailed design of the VT does not include any special control features as defined in the ICAM Documentation Standards manual.

3.7 Storage Allocation

The executable sizes for the device driver routines for each supported terminal are:

ADM3A	172 blocks
CI600	165 blocks
IBM3270	not available
PRINTR	153 blocks
PW3270	not available
VIP	174 blocks
VT100	176 blocks
VT100W	176 blocks
VTMIN	175 blocks

3.8 Object Code Creation

The VT routines were compiled using a C compiler developed by Interactive Software under VAX/VMS.

3.9 Adaptation Data

The C source modules for the VT can be compiled using any UNIX version 7 compatible C compiler. All routines beginning with 'TRM' are device dependent, and the routine TERMIO.C is VAX specific.

3.10 Detailed Design Description

3.10.1 Main Program List

The following is a list of all "Main Programs" which are modules that are not called by any other module being documented here. These modules are either program entry points or, if they are hooked into another set of programs via subroutine calls, they are the points the external programs can call and therefore enter through. To differentiate between the two types of entry points, look at the individual Module Documentation (section 3.10.8) and look at Module Type for each of the Main Program modules listed. Note whether the routine is a Program, Subroutine, or Function. If it is a Program, it is truly a main program entry point. If not, then it is merely called by other programs not being documented here.

VIRTUAL TERMINAL Main Program List

Module Name	Purpose
DRIVER/MAIN	MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER

3.10.2 Module List

The following is a list of all the modules being documented here along with their purpose. Each module has a unique name, no matter what language it was written in.

VIRTUAL TERMINAL Module List

Module Name	Purpose
ABSPOS	ABSOLUTIZE CURSOR POSITION OF FIELD
BLDMSG	BUILD MESSAGE
BLDMSG/BLDBUF	BUILD BUFFER
BLDMSG/REDOFF	READ FLAG TURNED OFF
BVTIDS	BUILD VTI DATA STRUCTURE
BVTIDS/BVTIFM	BUILD VTI FIELD MAP
BVTIDS/CLRFLG	CLEAR FLAGS
BVTIDS/CVTIFM	CLEAR VTI FIELD MAP
BVTIDS/INSFLD	INSERT FIELD
BVTIDS/RVTIFM	REBUILD VTI FIELD MAP
CLRMOD	CLEAR MODIFY FLAGS
DEFFLD	DEFINE FIELD
DEFWND	DEFINE WINDOW
DOSCR/ERASE	ERASE PART OF SCREEN
DOSCR/HSCR	HORIZONTAL SCROLL
DOSCR/VSCR	VERTICAL SCROLL
DOSCREEN	DO COMMAND TO INTERNAL SCREEN
DRIVER/MAIN	MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER
ERAWND	ERASE WINDOW
FATAL	REPORT FATAL ERROR

VIRTUAL TERMINAL Module List

Module Name	Purpose
FNDWND	FIND WINDOW
GETVT	GET DATA FROM VIRTUAL TERMINAL
GVTICMD	GET VIRTUAL TERMINAL INTERFACE COMMAND
INTVT	INITIALIZE VIRTUAL TERMINAL
INVIS	CHECK FOR INVISIBILITY
PCHVTI	PUT SCREEN CHARACTERS TO VTI DATA STRUCTURE
PRCCMDS	PROCESS COMMAND
PUTVT	PUT DATA TO VIRTUAL TERMINAL
PVTICMD	PUT VTI COMMAND
PVTICMD/PUTNUM	PUT NUMBER
REFRESH	REFRESH TERMINAL
REFTERM	REFRESH TERMINAL
RMVWND	REMOVE WINDOW
SLINEND	FIND SCREEN LINE END
STFMTF	SET FORMAT FLAG FOR ALL CHILDREN WINDOWS AND FIELDS
STRDPN	SET READ PENDING FLAGS
STRDPN/STFDRD	SET FIELD READ PENDING
SWNPRC	SET WINDOW PRECEDENCE
TPUTNUM	TERMINAL PUT NUMBER
TPUTS	TERMINAL PUT STRING

VIRTUAL TERMINAL Module List

Module Name	Purpose
TRMCHK	TERMINAL CHECK
TRMEND	TERMINAL END
TRMFLS	TERMINAL FLUSH
TRMGET	TERMINAL GET
TRMINI	TERMINAL INITIALIZE
TRMPUT	TERMINAL PUT
TRMVT	TERMINATE VIRTUAL TERMINAL
TVTPRC	TERMINATE VTI PROCESS
VT100/MOVCUR	MOVE CURSOR (INTERNAL)
VT100/SETATR	SET ATTRIBUTES (INTERNAL)

3.10.3 External Routines List

The following is a list of all routines or functions not documented here that are called by modules that are documented here. The first caller, in alphabetical order, is listed as well. The specification in which any module is documented may be found in the Module Documentation Index (Document Number CM 620100001). See section 3.10.6 for a list of the modules that call each of these external routines.

VIRTUAL TERMINAL External Routines List

Module Name	First User
BLDCMD	BVTIDS
CABIT	TRMPUT
CALLOC	DEFWND
CBIT	DOSCR/ERASE
COL	TRMPUT
CSTR	INTVT
DELAY	DRIVER/MAIN
EXIT	TVTPRC
FCLOSE	DRIVER/MAIN
FFBDA	TRMPUT
FFBSA	VT100/SETATR
FFBSB	DOSCREEN
FIX	DOSCREEN
FLOOR	DOSCREEN
FOPEN	DRIVER/MAIN
FPRINTF	DRIVER/MAIN
FREE	BVTIDS/INSFLD
FSEARCH	DRIVER/MAIN
FWRITE	DRIVER/MAIN
GETCHAR	TRMPUT
INITEX	DRIVER/MAIN
ISDIGIT	TRMGET
ISPRINT	GVTICMD
LIMIT	DOSCREEN
MALLOC	BVTIDS/INSFLD
MAX	PCHVTI
MEMCMP	DRIVER/MAIN
MEMCPY	DRIVER/MAIN
MEMSET	DEFFLD
MIN	DOSCR/VSCR
NSEND	DRIVER/MAIN
POS	TRMPUT
PRINTF	FATAL
PRNEND	TRMEND
PRNFLS	TRMPUT
PRNINI	TRMINI
PRNPUT	TRMPUT
PUTC	DRIVER/MAIN
RCV	DRIVER/MAIN
ROW	REFRESH
SBIT	DOSCR/VSCR

VIRTUAL TERMINAL External Routines List

Module Name	First User
SIGNAL	DRIVER/MAIN
SPRINTF	DRIVER/MAIN
STRASN	BVTIDS/CVTIFM
STRCAT	DRIVER/MAIN
STRCPY	DRIVER/MAIN
STRLEN	BLDMSG/BLDBUF
TBIT	DOSCR/ERASE
TBOPEN	TRMINI
TCHECK	TRMCHK
TCLOSE	TRMEND
TFLUSH	TRMFLS
TGETC	TRMGET
TOLOWER	DRIVER/MAIN
TPURGE	TRMGET
TPUTC	VT100/SETATR
TRMNAT	DRIVER/MAIN
ZERO	DOSCREEN

3.10.4 Include File List

The following is a list of all include files called in by modules being documented here. Each include file has a unique name regardless of the language being used. The purpose of each include file is listed as well. A more complete description of each include file is given in section 3.10.9. The purpose listed is the one that is in the source code of the include file.

A purpose of "**** PURPOSE NOT FOUND BY STRIPPER ****" indicates that a purpose statement was not written into the include file itself. The most common reason for this is that the include file comes from system libraries that were not developed by the project, such as 'C' libraries that are provided with the 'C' compiler.

See section 3.10.6 for a set of lists which show all the modules which call in each of these include files.

VIRTUAL TERMINAL Include File List

File Name	Purpose
BITS	INCLUDE FILE FOR BIT MANIPULATION ROUTINES
CI600.C"	**** PURPOSE NOT FOUND BY STRIPPER ****
CTLCHR	CONTROL CHARACTERS
CTYPE	**** PURPOSE NOT FOUND BY STRIPPER ****
DEVICE	PHYSICAL DEVICE DATA STRUCTURE
DEVINI	DEVICE INITIALIZATIONS
FUNCTS	FUNCTION DEFINITIONS
NTM	NTM INTERFACE INCLUDE FILE
SCREEN	INTERNAL SCREEN DEFINITIONS
SIGNAL	**** PURPOSE NOT FOUND BY STRIPPER ****
STDIO	**** PURPOSE NOT FOUND BY STRIPPER ****
STDTYP	STANDARD TYPE DEFINITIONS
TERMIO	TRANSPARENT TERMINAL I/O DEFINITIONS
TRMRTN	TERMINAL (DEVICE DRIVER) ROUTINES

3.10.5 Where Include File Used List

The following lists each include file from 3.10.4 and all the modules documented in this specification which include them. The purpose of each module is listed as well.

VIRTUAL TERMINAL Where-include-file-used List

Include File	Module Name	Module Purpose
BITS		
	BLDMSG	BUILD MESSAGE
	BLDMSG/BL	BUILD BUFFER
	BLDMSG/RE	READ FLAG TURNED OFF
	BVTIDS	BUILD VTI DATA STRUCTURE
	BVTIDS/BV	BUILD VTI FIELD MAP
	BVTIDS/CL	CLEAR FLAGS
	BVTIDS/CV	CLEAR VTI FIELD MAP
	BVTIDS/IN	INSERT FIELD
	BVTIDS/RV	REBUILD VTI FIELD MAP
	CLRMOD	CLEAR MODIFY FLAGS
	DEFFLD	DEFINE FIELD
	DEFWND	DEFINE WINDOW
	DOSCR/ERA	ERASE PART OF SCREEN
	DOSCR/HSC	HORIZONTAL SCROLL
	DOSCR/VSC	VERTICAL SCROLL
	DOSCREEN	DO COMMAND TO INTERNAL SCREEN
	DRIVER/MA	MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER
	ERAWND	ERASE WINDOW
	GETVT	GET DATA FROM VIRTUAL TERMINAL
	GVTICMD	GET VIRTUAL TERMINAL INTERFACE COMMAND
	INTVT	INITIALIZE VIRTUAL TERMINAL
	INVIS	CHECK FOR INVISIBILITY
	PCHVTI	PUT SCREEN CHARACTERS TO VTI DATA STRUCTURE
	PRCCMDS	PROCESS COMMAND
	PUTVT	PUT DATA TO VIRTUAL TERMINAL
	PVTICMD	PUT VTI COMMAND
	PVTICMD/P	PUT NUMBER
	REFRESH	REFRESH TERMINAL
	REFTERM	REFRESH TERMINAL
	RMVWND	REMOVE WINDOW
	SLINEND	FIND SCREEN LINE END
	STFMTF	SET FORMAT FLAG FOR ALL CHILDREN WINDOWS AND FIELDS
	SWNPRC	SET WINDOW PRECEDENCE
	TRMCHK	TERMINAL CHECK
	TRMEND	TERMINAL END
	TRMFLS	TERMINAL FLUSH

VIRTUAL TERMINAL Where-include-file-used List

Include File	Module Name	Module Purpose
	TRMGET	TERMINAL GET
	TRMINI	TERMINAL INITIALIZE
	TRMPUT	TERMINAL PUT
	TRMVT	TERMINATE VIRTUAL TERMINAL
	VT100/MOV	MOVE CURSOR (INTERNAL)
	VT100/SET	SET ATTRIBUTES (INTERNAL)
CI600.C"		
	TRMCHK	TERMINAL CHECK
	TRMEND	TERMINAL END
	TRMFLS	TERMINAL FLUSH
	TRMGET	TERMINAL GET
	TRMINI	TERMINAL INITIALIZE
	TRMPUT	TERMINAL PUT
	VT100/MOV	MOVE CURSOR (INTERNAL)
	VT100/SET	SET ATTRIBUTES (INTERNAL)
CTLCHR		
	BLDMSG	BUILD MESSAGE
	BLDMSG/BL	BUILD BUFFER
	BLDMSG/RE	READ FLAG TURNED OFF
	DRIVER/MA	MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER
	GVTICMD	GET VIRTUAL TERMINAL INTERFACE COMMAND
	INTVT	INITIALIZE VIRTUAL TERMINAL
	PVTICMD	PUT VTI COMMAND
	PVTICMD/P	PUT NUMBER
	TRMVT	TERMINATE VIRTUAL TERMINAL
CTYPE		
	DEFFLD	DEFINE FIELD

VIRTUAL TERMINAL Where-include-file-used List

Include File	Module Name	Module Purpose
	GVTICMD	GET VIRTUAL TERMINAL INTERFACE COMMAND
	TRMCHK	TERMINAL CHECK
	TRMEND	TERMINAL END
	TRMFLS	TERMINAL FLUSH
	TRMGET	TERMINAL GET
	TRMINI	TERMINAL INITIALIZE
	TRMPUT	TERMINAL PUT
	VT100/MOV	MOVE CURSOR (INTERNAL)
	VT100/SET	SET ATTRIBUTES (INTERNAL)

DEVICE

	ABSPOS	ABSOLUTIZE CURSOR POSITION OF FIELD
	BLDMSG	BUILD MESSAGE
	BLDMSG/BL	BUILD BUFFER
	BLDMSG/RE	READ FLAG TURNED OFF
	BVTIDS	BUILD VTI DATA STRUCTURE
	BVTIDS/BV	BUILD VTI FIELD MAP
	BVTIDS/CL	CLEAR FLAGS
	BVTIDS/CV	CLEAR VTI FIELD MAP
	BVTIDS/IN	INSERT FIELD
	BVTIDS/RV	REBUILD VTI FIELD MAP
	DEFFLD	DEFINE FIELD
	DEFWND	DEFINE WINDOW
	DRIVER/MA	MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER
	ERAWND	ERASE WINDOW
	FNDWND	FIND WINDOW
	GETVT	GET DATA FROM VIRTUAL TERMINAL
	PCHVTI	PUT SCREEN CHARACTERS TO VTI DATA STRUCTURE
	PUTVT	PUT DATA TO VIRTUAL TERMINAL
	RMVWND	REMOVE WINDOW
	STFMTF	SET FORMAT FLAG FOR ALL CHILDREN WINDOWS AND FIELDS
	STRDPN	SET READ PENDING FLAGS
	STRDPN/ST	SET FIELD READ PENDING
	SWNPRC	SET WINDOW PRECEDENCE

VIRTUAL TERMINAL Where-include-file-used List

Include File	Module Name	Module Purpose
DEVINI		
	DRIVER/MA	MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER
FUNCTS		
	BLDMSG	BUILD MESSAGE
	BLDMSG/BL	BUILD BUFFER
	BLDMSG/RE	READ FLAG TURNED OFF
	BVTIDS	BUILD VTI DATA STRUCTURE
	BVTIDS/BV	BUILD VTI FIELD MAP
	BVTIDS/CL	CLEAR FLAGS
	BVTIDS/CV	CLEAR VTI FIELD MAP
	BVTIDS/IN	INSERT FIELD
	BVTIDS/RV	REBUILD VTI FIELD MAP
	DEFFLD	DEFINE FIELD
	DEFWND	DEFINE WINDOW
	DOSCR/ERA	ERASE PART OF SCREEN
	DOSCR/HSC	HORIZONTAL SCROLL
	DOSCR/VSC	VERTICAL SCROLL
	DOSCREEN	DO COMMAND TO INTERNAL SCREEN
	DRIVER/MA	MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER
	GETVT	GET DATA FROM VIRTUAL TERMINAL
	GVTICMD	GET VIRTUAL TERMINAL INTERFACE COMMAND
	INTVT	INITIALIZE VIRTUAL TERMINAL
	PCHVTI	PUT SCREEN CHARACTERS TO VTI DATA STRUCTURE
	PRCCMDS	PROCESS COMMAND
	PUTVT	PUT DATA TO VIRTUAL TERMINAL
	PVTICMD	PUT VTI COMMAND
	PVTICMD/P	PUT NUMBER
	REFRESH	REFRESH TERMINAL
	REFTERM	REFRESH TERMINAL

VIRTUAL TERMINAL Where-include-file-used List

Include File	Module Name	Module Purpose
	STFMTF	SET FORMAT FLAG FOR ALL CHILDREN WINDOWS AND FIELDS
	SWNPRC	SET WINDOW PRECEDENCE
	TRMCHK	TERMINAL CHECK
	TRMEND	TERMINAL END
	TRMFLS	TERMINAL FLUSH
	TRMGET	TERMINAL GET
	TRMINI	TERMINAL INITIALIZE
	TRMPUT	TERMINAL PUT
	TRMVT	TERMINATE VIRTUAL TERMINAL
	VT100/MOV	MOVE CURSOR (INTERNAL)
	VT100/SET	SET ATTRIBUTES (INTERNAL)
NTM		
	DRIVER/MA	MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER
SCREEN		
	BLDMSG	BUILD MESSAGE
	BLDMSG/BL	BUILD BUFFER
	BLDMSG/RE	READ FLAG TURNED OFF
	BVTIDS	BUILD VTI DATA STRUCTURE
	BVTIDS/BV	BUILD VTI FIELD MAP
	BVTIDS/CL	CLEAR FLAGS
	BVTIDS/CV	CLEAR VTI FIELD MAP
	BVTIDS/IN	INSERT FIELD
	BVTIDS/RV	REBUILD VTI FIELD MAP
	CLRMOD	CLEAR MODIFY FLAGS
	DOSCR/ERA	ERASE PART OF SCREEN
	DOSCR/HSC	HORIZONTAL SCROLL
	DOSCR/VSC	VERTICAL SCROLL
	DOSCREEN	DO COMMAND TO INTERNAL SCREEN
	DRIVER/MA	MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER

VIRTUAL TERMINAL Where-include-file-used List

Include File	Module Name	Module Purpose
	GETVT	GET DATA FROM VIRTUAL TERMINAL
	INTVT	INITIALIZE VIRTUAL TERMINAL
	INVIS	CHECK FOR INVISIBILITY
	PCHVTI	PUT SCREEN CHARACTERS TO VTI DATA STRUCTURE
	PRCCMDS	PROCESS COMMAND
	PUTVT	PUT DATA TO VIRTUAL TERMINAL
	PVTICMD	PUT VTI COMMAND
	PVTICMD/P	PUT NUMBER
	REFRESH	REFRESH TERMINAL
	REFTERM	REFRESH TERMINAL
	SLINEND	FIND SCREEN LINE END
	TRMCHK	TERMINAL CHECK
	TRMEND	TERMINAL END
	TRMFLS	TERMINAL FLUSH
	TRMGET	TERMINAL GET
	TRMINI	TERMINAL INITIALIZE
	TRMPUT	TERMINAL PUT
	TRMVT	TERMINATE VIRTUAL TERMINAL
	VT100/MOV	MOVE CURSOR (INTERNAL)
	VT100/SET	SET ATTRIBUTES (INTERNAL)
SIGNAL		
	DRIVER/MA	MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER
STDIO		
	DRIVER/MA	MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER
	FATAL	REPORT FATAL ERROR
	TRMCHK	TERMINAL CHECK
	TRMEND	TERMINAL END
	TRMFLS	TERMINAL FLUSH
	TRMGET	TERMINAL GET

VIRTUAL TERMINAL Where-include-file-used List

Include File	Module Name	Module Purpose
	PVTICMD/P	PUT NUMBER
	REFRESH	REFRESH TERMINAL
	REFTERM	REFRESH TERMINAL
	RMVWND	REMOVE WINDOW
	SLINEND	FIND SCREEN LINE END
	STFMTF	SET FORMAT FLAG FOR ALL CHILDREN WINDOWS AND FIELDS
	STRDPN	SET READ PENDING FLAGS
	STRDPN/ST	SET FIELD READ PENDING
	SWNPRC	SET WINDOW PRECEDENCE
	TPUTNUM	TERMINAL PUT NUMBER
	TPUTS	TERMINAL PUT STRING
	TRMCHK	TERMINAL CHECK
	TRMEND	TERMINAL END
	TRMFLS	TERMINAL FLUSH
	TRMGET	TERMINAL GET
	TRMINI	TERMINAL INITIALIZE
	TRMPUT	TERMINAL PUT
	TRMVT	TERMINATE VIRTUAL TERMINAL
	TVTPRC	TERMINATE VTI PROCESS
	VT100/MOV	MOVE CURSOR (INTERNAL)
	VT100/SET	SET ATTRIBUTES (INTERNAL)
TERMIO		
	DRIVER/MA	MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER
	PRCCMDS	PROCESS COMMAND
	PUTVT	PUT DATA TO VIRTUAL TERMINAL
	TPUTNUM	TERMINAL PUT NUMBER
	TPUTS	TERMINAL PUT STRING
	TRMCHK	TERMINAL CHECK
	TRMEND	TERMINAL END
	TRMFLS	TERMINAL FLUSH
	TRMGET	TERMINAL GET
	TRMINI	TERMINAL INITIALIZE
	TRMPUT	TERMINAL PUT
	VT100/MOV	MOVE CURSOR (INTERNAL)

VIRTUAL TERMINAL Where-include-file-used List

Include File	Module Name	Module Purpose
	TRMINI	TERMINAL INITIALIZE
	TRMPUT	TERMINAL PUT
	VT100/MOV	MOVE CURSOR (INTERNAL)
	VT100/SET	SET ATTRIBUTES (INTERNAL)
STDTYP		
	ABSPOS	ABSOLUTIZE CURSOR POSITION OF FIELD
	BLDMSG	BUILD MESSAGE
	BLDMSG/BL	BUILD BUFFER
	BLDMSG/RE	READ FLAG TURNED OFF
	BVTIDS	BUILD VTI DATA STRUCTURE
	BVTIDS/BV	BUILD VTI FIELD MAP
	BVTIDS/CL	CLEAR FLAGS
	BVTIDS/CV	CLEAR VTI FIELD MAP
	BVTIDS/IN	INSERT FIELD
	BVTIDS/RV	REBUILD VTI FIELD MAP
	CLRMOD	CLEAR MODIFY FLAGS
	DEFFLD	DEFINE FIELD
	DEFWND	DEFINE WINDOW
	DOSCR/ERA	ERASE PART OF SCREEN
	DOSCR/HSC	HORIZONTAL SCROLL
	DOSCR/VSC	VERTICAL SCROLL
	DOSCREEN	DO COMMAND TO INTERNAL SCREEN
	DRIVER/MA	MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER
	ERAWND	ERASE WINDOW
	FATAL	REPORT FATAL ERROR
	FNDWND	FIND WINDOW
	GETVT	GET DATA FROM VIRTUAL TERMINAL
	GVTICMD	GET VIRTUAL TERMINAL INTERFACE COMMAND
	INTVT	INITIALIZE VIRTUAL TERMINAL
	INVIS	CHECK FOR INVISIBILITY
	PCHVTI	PUT SCREEN CHARACTERS TO VTI DATA STRUCTURE
	PRCCMDS	PROCESS COMMAND
	PUTVT	PUT DATA TO VIRTUAL TERMINAL
	PVTICMD	PUT VTI COMMAND

VIRTUAL TERMINAL Where-include-file-used List

Include File	Module Name	Module Purpose
	VT100/SET	SET ATTRIBUTES (INTERNAL)
TRMRTN		
	DRIVER/MA	MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER
	GETVT	GET DATA FROM VIRTUAL TERMINAL
	INTVT	INITIALIZE VIRTUAL TERMINAL
	PRCCMDS	PROCESS COMMAND
	PUTVT	PUT DATA TO VIRTUAL TERMINAL
	REFRESH	REFRESH TERMINAL
	REFTERM	REFRESH TERMINAL
	TRMCHK	TERMINAL CHECK
	TRMEND	TERMINAL END
	TRMFLS	TERMINAL FLUSH
	TRMGET	TERMINAL GET
	TRMINI	TERMINAL INITIALIZE
	TRMPUT	TERMINAL PUT
	TRMVT	TERMINATE VIRTUAL TERMINAL
	VT100/MOV	MOVE CURSOR (INTERNAL)
	VT100/SET	SET ATTRIBUTES (INTERNAL)

3.10.6 Where External Routine Used List

The following lists each external function or routine listed in 3.10.3 and all the documented modules which call it. The purpose of each module is listed as well.

VIRTUAL TERMINAL Where-external-routine-used List

System Module	Module Name	Module Purpose
BLDCMD		
	BVTIDS	BUILD VTI DATA STRUCTURE
	DRIVER/MAI	MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER
	GETVT	GET DATA FROM VIRTUAL TERMINAL
	PRCCMDS	PROCESS COMMAND
	PUTVT	PUT DATA TO VIRTUAL TERMINAL
	REFRESH	REFRESH TERMINAL
	REFTERM	REFRESH TERMINAL
	TRMGET	TERMINAL GET
CABIT		
	DOSCREEN	DO COMMAND TO INTERNAL SCREEN
	TRMPUT	TERMINAL PUT
CALLOC		
	DEFFLD	DEFINE FIELD
	DEFWND	DEFINE WINDOW
	DRIVER/MAI	MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER
CBIT		
	CLRMOD	CLEAR MODIFY FLAGS
	DOSCR/ERASE	ERASE PART OF SCREEN
	DOSCR/VSCR	VERTICAL SCROLL
	DOSCREEN	DO COMMAND TO INTERNAL SCREEN
	REFRESH	REFRESH TERMINAL
	REFTERM	REFRESH TERMINAL
COL		
	BLDMSG	BUILD MESSAGE
	BVTIDS	BUILD VTI DATA STRUCTURE

VIRTUAL TERMINAL Where-external-routine-used List

System Module	Module Name	Module Purpose
	DOSCR/ERASE	ERASE PART OF SCREEN
	DOSCR/HSCR	HORIZONTAL SCROLL
	DOSCR/VSCR	VERTICAL SCROLL
	DOSCREEN	DO COMMAND TO INTERNAL SCREEN
	PRCCMDS	PROCESS COMMAND
	REFRESH	REFRESH TERMINAL
	REFTERM	REFRESH TERMINAL
	SLINEND	FIND SCREEN LINE END
	TRMGET	TERMINAL GET
	TRMPUT	TERMINAL PUT
	VT100/MOVC	MOVE CURSOR (INTERNAL)
CSTR		
	INTVT	INITIALIZE VIRTUAL TERMINAL
DELAY		
	DRIVER/MAI	MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER
EXIT		
	DRIVER/MAI	MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER
	TVTPRC	TERMINATE VTI PROCESS
FCLOSE		
	DRIVER/MAI	MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER
FFBDA		
	TRMPUT	TERMINAL PUT

VIRTUAL TERMINAL Where-external-routine-used List

System Module	Module Name	Module Purpose
FFBSA		
	DOSCREEN	DO COMMAND TO INTERNAL SCREEN
	TRMPUT	TERMINAL PUT
	VT100/SETA	SET ATTRIBUTES (INTERNAL)
FFBSB		
	DOSCREEN	DO COMMAND TO INTERNAL SCREEN
FIX		
	DOSCREEN	DO COMMAND TO INTERNAL SCREEN
FLOOR		
	DOSCREEN	DO COMMAND TO INTERNAL SCREEN
FOPEN		
	DRIVER/MAI	MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER
FPRINTF		
	DRIVER/MAI	MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER
FREE		
	BVTIDS/CVTC	CLEAR VTI FIELD MAP
	BVTIDS/INSI	INSERT FIELD

VIRTUAL TERMINAL Where-external-routine-used List

System Module	Module Name	Module Purpose
	DRIVER/MAI	MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER
	ERAWND	ERASE WINDOW
	INTVT	INITIALIZE VIRTUAL TERMINAL
	RMVWND	REMOVE WINDOW
	TRMVT	TERMINATE VIRTUAL TERMINAL
FSEARCH		
	DRIVER/MAI	MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER
FWRITE		
	DRIVER/MAI	MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER
GETCHAR		
	TRMGET	TERMINAL GET
	TRMPUT	TERMINAL PUT
INITEX		
	DRIVER/MAI	MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER
ISDIGIT		
	GVTICMD	GET VIRTUAL TERMINAL INTERFACE COMMAND
	TRMGET	TERMINAL GET
ISPRINT		

VIRTUAL TERMINAL Where-external-routine-used List

System Module	Module Name	Module Purpose
	DEFFLD	DEFINE FIELD
	GVTICMD	GET VIRTUAL TERMINAL INTERFACE COMMAND
	TRMGET	TERMINAL GET
LIMIT		
	DOSCREEN	DO COMMAND TO INTERNAL SCREEN
MALLOC		
	BVTIDS/BVT	BUILD VTI FIELD MAP
	BVTIDS/CVT	CLEAR VTI FIELD MAP
	BVTIDS/INS	INSERT FIELD
	DEFFLD	DEFINE FIELD
	DRIVER/MAI	MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER
	INTVT	INITIALIZE VIRTUAL TERMINAL
MAX		
	BVTIDS	BUILD VTI DATA STRUCTURE
	BVTIDS/INS	INSERT FIELD
	DEFWND	DEFINE WINDOW
	DOSCR/VSCR	VERTICAL SCROLL
	DOSCREEN	DO COMMAND TO INTERNAL SCREEN
	PCHVTI	PUT SCREEN CHARACTERS TO VTI DATA STRUCTURE
	REFTERM	REFRESH TERMINAL
MEMCMP		
	BVTIDS	BUILD VTI DATA STRUCTURE
	DRIVER/MAI	MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER

VIRTUAL TERMINAL Where-external-routine-used List

System Module	Module Name	Module Purpose
MEMCPY		
	BLDMSG	BUILD MESSAGE
	BLDMSG/BLD	BUILD BUFFER
	DRIVER/MAI	MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER
MEMSET		
	DEFFLD	DEFINE FIELD
MIN		
	BVTIDS/INS	INSERT FIELD
	DEFWND	DEFINE WINDOW
	DOSCR/HSCR	HORIZONTAL SCROLL
	DOSCR/VSCR	VERTICAL SCROLL
	DRIVER/MAI	MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER
	REFTERM	REFRESH TERMINAL
NSEND		
	DRIVER/MAI	MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER
POS		
	DOSCREEN	DO COMMAND TO INTERNAL SCREEN
	TRMPUT	TERMINAL PUT
PRINTF		

VIRTUAL TERMINAL Where-external-routine-used List

System Module	Module Name	Module Purpose
	DRIVER/MAIMAIN	MODULE FOR WINDOW MANAGER AND DEVICE DRIVER
	FATAL	REPORT FATAL ERROR
	TRMGET	TERMINAL GET
	TRMPUT	TERMINAL PUT
PRNEND		
	TRMEND	TERMINAL END
PRNFLS		
	TRMPUT	TERMINAL PUT
PRNINI		
	TRMINI	TERMINAL INITIALIZE
PRNPUT		
	TRMPUT	TERMINAL PUT
PUTC		
	DRIVER/MAIMAIN	MODULE FOR WINDOW MANAGER AND DEVICE DRIVER
RCV		
	DRIVER/MAIMAIN	MODULE FOR WINDOW MANAGER AND DEVICE DRIVER

VIRTUAL TERMINAL Where-external-routine-used List

System Module	Module Name	Module Purpose
ROW		
	BLDMSG	BUILD MESSAGE
	BVTIDS	BUILD VTI DATA STRUCTURE
	DOSCR/VSCR	VERTICAL SCROLL
	DOSCREEN	DO COMMAND TO INTERNAL SCREEN
	PRCCMDS	PROCESS COMMAND
	REFRESH	REFRESH TERMINAL
	REFTERM	REFRESH TERMINAL
	TRMGET	TERMINAL GET
	TRMPUT	TERMINAL PUT
	VT100/MOVC	MOVE CURSOR (INTERNAL)
SBIT		
	DOSCR/ERASE	ERASE PART OF SCREEN
	DOSCR/VSCR	VERTICAL SCROLL
	DOSCREEN	DO COMMAND TO INTERNAL SCREEN
	REFRESH	REFRESH TERMINAL
	REFTERM	REFRESH TERMINAL
	TRMPUT	TERMINAL PUT
SIGNAL		
	DRIVER/MAI	MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER
SPRINTF		
	BLDMSG	BUILD MESSAGE
	BLDMSG/BLD	BUILD BUFFER
	DRIVER/MAI	MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER
STRASN		
	BVTIDS	BUILD VTI DATA STRUCTURE

VIRTUAL TERMINAL Where-external-routine-used List

System Module	Module Name	Module Purpose
	BVTIDS/CVTCLEAR	VTI FIELD MAP
	BVTIDS/INSINSERT	FIELD
	DOSCR/ERASERASE	PART OF SCREEN
STRCAT		
	DRIVER/MAIMAIN	MODULE FOR WINDOW MANAGER AND DEVICE DRIVER
STRCPY		
	DRIVER/MAIMAIN	MODULE FOR WINDOW MANAGER AND DEVICE DRIVER
STRLEN		
	BLDMSG	BUILD MESSAGE
	BLDMSG/BLDBUILD	BUFFER
	DRIVER/MAIMAIN	MODULE FOR WINDOW MANAGER AND DEVICE DRIVER
TBIT		
	DOSCR/ERASERASE	PART OF SCREEN
	DOSCR/HSCRHORIZONTAL	SCROLL
	DOSCR/VSCRVERTICAL	SCROLL
	DOSCREEN	DO COMMAND TO INTERNAL SCREEN
	GETVT	GET DATA FROM VIRTUAL TERMINAL
	INVIS	CHECK FOR INVISIBILITY
	PCHVTI	PUT SCREEN CHARACTERS TO VTI DATA STRUCTURE
	PRCCMDS	PROCESS COMMAND
	PUTVT	PUT DATA TO VIRTUAL TERMINAL
	REFRESH	REFRESH TERMINAL
	REFTERM	REFRESH TERMINAL
	TRMGET	TERMINAL GET

VIRTUAL TERMINAL Where-external-routine-used List

System Module	Module Name	Module Purpose
	TRMPUT	TERMINAL PUT
TBOPEN	TRMINI	TERMINAL INITIALIZE
TCHECK	TRMCHK	TERMINAL CHECK
TCLOSE	TRMEND	TERMINAL END
TFLUSH	TRMFLS	TERMINAL FLUSH
TGETC	TRMGET	TERMINAL GET
TOLOWER	DRIVER/MAI	MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER
TPURGE	TRMGET	TERMINAL GET

VIRTUAL TERMINAL Where-external-routine-used List

System Module	Module Name	Module Purpose
TPUTC		
	TPUTNUM	TERMINAL PUT NUMBER
	TPUTS	TERMINAL PUT STRING
	TRMPUT	TERMINAL PUT
	VT100/MOVC	MOVE CURSOR (INTERNAL)
	VT100/SETA	SET ATTRIBUTES (INTERNAL)
TRMNAT		
	DRIVER/MAI	MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER
	TVTPRC	TERMINATE VTI PROCESS
ZERO		
	DOSCREEN	DO COMMAND TO INTERNAL SCREEN

3.10.7 Main Program Parts List

The following lists each Main Program listed in 3.10.1 and all the modules which are called either by that module itself or by any of the documented modules which it calls. It is possible for a non-main module to be listed more that once if it is called by multiple modules. The called modules, in this case known as program parts, are marked as to whether they are documented here. If so, the phrase "well-defined module" appears by the module name, if not it is an "external "routine". The Purpose of the Main Program module is listed as well.

VIRTUAL TERMINAL Main Program Parts List

Main Pgm Name	Module Name	Module Type
DRIVER/MAIN	Purpose-->	MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER
	ABSPOS	Well-defined module
	BLDCMD	External routine
	BLDMSG	Well-defined module
	BLDMSG/BLDBUF	Well-defined module
	BLDMSG/REDOFF	Well-defined module
	BVTIDS	Well-defined module
	BVTIDS/BVTIFM	Well-defined module
	BVTIDS/CLRFLG	Well-defined module
	BVTIDS/CVTIFM	Well-defined module
	BVTIDS/INSFLD	Well-defined module
	BVTIDS/RVTIFM	Well-defined module
	CABIT	External routine
	CALLOC	External routine
	CBIT	External routine
	CLRMOD	Well-defined module
	COL	External routine
	CSTR	External routine
	DEFFLD	Well-defined module
	DEFWND	Well-defined module
	DELAY	External routine
	DOSCR/ERASE	Well-defined module
	DOSCR/HSCR	Well-defined module
	DOSCR/VSCR	Well-defined module
	DOSCREEN	Well-defined module
	ERAWND	Well-defined module
	EXIT	External routine
	FATAL	Well-defined module
	FCLOSE	External routine
	FFBDA	External routine
	FFBSA	External routine
	FFBSB	External routine
	FIX	External routine
	FLOOR	External routine
	FNDWND	Well-defined module
	FOPEN	External routine
	FPRINTF	External routine
	FREE	External routine
	FSEARCH	External routine

VIRTUAL TERMINAL Main Program Parts List

Main Pgm Name	Module Name	Module Type
	FWRITE	External routine
	GETCHAR	External routine
	GETVT	Well-defined module
	GVTICMD	Well-defined module
	INITEX	External routine
	INTVT	Well-defined module
	INVIS	Well-defined module
	ISDIGIT	External routine
	ISPRINT	External routine
	LIMIT	External routine
	MALLOC	External routine
	MAX	External routine
	MEMCMP	External routine
	MEMCPY	External routine
	MEMSET	External routine
	MIN	External routine
	NSEND	External routine
	PCHVTI	Well-defined module
	POS	External routine
	PRCCMDS	Well-defined module
	PRINTF	External routine
	PRNEND	External routine
	PRNFLS	External routine
	PRNINI	External routine
	PRNPUT	External routine
	PUTC	External routine
	PUTVT	Well-defined module
	PVTICMD	Well-defined module
	PVTICMD/PUTNUM	Well-defined module
	RCV	External routine
	REFRESH	Well-defined module
	REFTERM	Well-defined module
	RMVWND	Well-defined module
	ROW	External routine
	SBIT	External routine
	SIGNAL	External routine
	SLINEND	Well-defined module
	SPRINTF	External routine
	STFMTF	Well-defined module
	STRASN	External routine

VIRTUAL TERMINAL Main Program Parts List

Main Pgm Name	Module Name	Module Type
	STRCAT	External routine
	STRCPY	External routine
	STRDPN	Well-defined module
	STRDPN/STFDRD	Well-defined module
	STRLEN	External routine
	SWNPRC	Well-defined module
	TBIT	External routine
	TBOPEN	External routine
	TCHECK	External routine
	TCLOSE	External routine
	TFLUSH	External routine
	TGETC	External routine
	TOLOWER	External routine
	TPURGE	External routine
	TPUTC	External routine
	TPUTNUM	Well-defined module
	TPUTS	Well-defined module
	TRMCHK	Well-defined module
	TRMEND	Well-defined module
	TRMFLS	Well-defined module
	TRMGET	Well-defined module
	TRMINI	Well-defined module
	TRMNAT	External routine
	TRMPUT	Well-defined module
	TRMVT	Well-defined module
	TVTPRC	Well-defined module
	VT100/MOVCUR	Well-defined module
	VT100/SETATR	Well-defined module
	ZERO	External routine

3.10.8 Module Documentation

The following documentation describes information which is specific to each individual module being documented in this specification as listed in section 3.10.2. It provides a compact way of getting information that would be otherwise buried within each module's source code.

The specific items in this module documentation have the following meanings:

NAME:	Name of program Module.
PURPOSE:	Purpose of Module as detailed in the source code.
LANGUAGE:	Programming language source code is written in. The choices are: VAX-11 FORTRAN C (I/S-1 Workbench 'C') VAX-11 COBOL
MODULE TYPE:	Whether a Program, Subroutine, or Function.
SOURCE FILE:	Name of Source File from file specification.
SOURCE FILE TYPE:	Source File Extension from file specification.
HOST:	Whether this is a host-dependent routine (VAX or IBM) or blank if host-independent.
SUBSYSTEM:	IISS sub-system this file resides in.
SUBDIRECTORY:	Sub-directory of that subsystem in which this file resides.
DOCUMENTATION GROUP:	Name of documentation group of which this source file is a member.
DESCRIPTION:	A description of the module as otained from the source code.
ARGUMENTS:	The arguments with which this routine is called if it is a Subroutine or a Function.
INCLUDE FILES:	A list of all the files that are included into this module as well as their purposes.

ROUTINES CALLED: Subroutines or Functions, either documented or external, called by this module, if any.

CALLED DIRECTLY BY: The documented routines which call this module, if any.

USED IN MAIN PROGRAM(S): The documented Main Programs which contain this module in their parts list according to the list in section 3.10.7.

The Module Documentation is arranged alphabetically according to Module Name.

VIRTUAL TERMINAL Module Documentation

```
NAME:                   ABSPOS
PURPOSE:                ABSOLUTIZE CURSOR POSITION OF FIELD
LANGUAGE:               C
MODULE TYPE:            SUBROUTINE
FUNCTION TYPE:          VOID ()
SOURCE FILE:            ABSPOS
SOURCE FILE TYPE:       .C
HOST:
SUBSYSTEM:              UI
SUBDIRECTORY:           DRIVER
DOCUMENTATION GROUP:    VIRTERM

DESCRIPTION:
------------

  SYNOPSIS
     VOID ABSPOS(WNDPTR,ACRPOS)
       WND      *WNDPTR;
       POSITION *ACRPOS;


     INPUTS/OUTPUTS:


     INPUTS:
       WNDPTR - WINDOW WHOSE ROW AND COL WANT TO ABSOLUTIZED
       ADDRESS OF STURCTURE FOR RETURNING VALUES OF:
                                                      ABSOLUTE
                     ROW
                                                      ABSOLUTE
                     COL
     OUTPUTS:
       STRUCTURE CONTAINING:
                              ABSOLUTE ROW OF FIELD
                              ABSOLUTE COL OF FIELD

  DESCRIPTION
     THIS MODULE ABSOLUTIZES A FIELD'S ROW AND COL BY GOING
                     BACK UP
     CHILD PARENT TREE AND ADDING EACH SUCCESSIVE PARENT'S ROW
                     AND COL
     TO SUM OF CHILDS'.

ARGUMENTS:
----------
  WNDPTR =        WND *
  ACRPOS =        POSITION *


INCLUDE FILES:
--------------
  STDTYP      - STANDARD TYPE DEFINITIONS
  DEVICE      - PHYSICAL DEVICE DATA STRUCTURE
```

CALLED DIRECTLY BY:

BVTIDS - BUILD VTI DATA STRUCTURE
PCHVTI - PUT SCREEN CHARACTERS TO VTI DATA STRUCTURE

USED IN MAIN PROGRAM(S):

DRIVER/MAI - MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER

VIRTUAL TERMINAL Module Documentation

```
NAME:                   BLDMSG
PURPOSE:                BUILD MESSAGE
LANGUAGE:               C
MODULE TYPE:            SUBROUTINE
FUNCTION TYPE:          VOID ()
SOURCE FILE:            BLDMSG
SOURCE FILE TYPE:       .C
HOST:
SUBSYSTEM:              UI
SUBDIRECTORY:           DRIVER
DOCUMENTATION GROUP:    VIRTERM
```

DESCRIPTION:

SYNOPSIS

```
VOID BLDMSG(BUFF, MAXLEN, LEN)
  CHAR BUFF[];
  INT  MAXLEN;
  INT  *LEN;
```

INPUTS/OUTPUTS:

INPUTS:
- ADDRESS OF BUFF WHERE FORMATED MESSAGE TO BE PUT
- MAXLEN - LENGTH OF THIS MEMORY AREA
- ADDRESS OF LOCATION WHERE LEN OF THIS FORMATTED MESSAGE TO BE PUT

OUTPUTS:
- BUFF - CONTAINES FORMATED MESSAGE
- LEN - CONTAINES LENGTH OF THIS FORMATED MESSAGE

DESCRIPTION

THIS MODULE BUILDS A FORMATED MESSAGE(TO BE SENT ACROSS NTM TO MONITOR)

ARGUMENTS:

```
BUFF =      CHAR []
MAXLEN =      INT
LEN =       INT *
```

INCLUDE FILES:

```
STDTYP    - STANDARD TYPE DEFINITIONS
BITS      - INCLUDE FILE FOR BIT MANIPULATION ROUTINES
SCREEN    - INTERNAL SCREEN DEFINITIONS
FUNCTS    - FUNCTION DEFINITIONS
CTLCHR    - CONTROL CHARACTERS
DEVICE    - PHYSICAL DEVICE DATA STRUCTURE
```

ROUTINES CALLED:

ROW
COL
BLDMSG/BLDBUF - BUILD BUFFER
SPRINTF
STRLEN
MEMCPY
BLDMSG/REDOFF - READ FLAG TURNED OFF
BVTIDS - BUILD VTI DATA STRUCTURE

CALLED DIRECTLY BY:

GETVT - GET DATA FROM VIRTUAL TERMINAL

USED IN MAIN PROGRAM(S):

DRIVER/MAI - MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER

VIRTUAL TERMINAL Module Documentation

```
NAME:                   BLDMSG/BLDBUF
PURPOSE:                BUILD BUFFER
LANGUAGE:               C
MODULE TYPE:            SUBROUTINE
FUNCTION TYPE:          VOID ()
SOURCE FILE:            BLDMSG
SOURCE FILE TYPE:       .C
HOST:
SUBSYSTEM:              UI
SUBDIRECTORY:           DRIVER
DOCUMENTATION GROUP:    VIRTERM

DESCRIPTION:
------------
  SYNOPSIS
     STATIC VOID BLDBUF(WNDPT, BUFPTR, BUFEND)
       REGISTER WND  *WNDPT;
       REGISTER CHAR **BUFPTR;
       CHAR          *BUFEND;

     INPUTS/OUTPUTS:


     INPUTS:
       WNDPT  - POINTER TO WINDOW FROM WHICH TO GET INFO TO
                PUT IN MESSAGE
       BUFPTR - ADDRESS OF POINTER WHERE FORMATED MESSAGE TO
                BE PUT
       BUFEND - END OF THIS MEMORY AREA

     OUTPUTS:
       BUFPTR - POINTS TO LAST ENTERY OF FORMATED MESSAGE

  DESCRIPTION
     THIS MODULE BUILDS A FORMATED MESSAGE(TO BE SENT ACROSS
                NTM TO MONITOR)
     FROM WINDOW POINTED TO BY WNDPT

ARGUMENTS:
----------
  WNDPT =       WND *
  BUFPTR =       CHAR **
  BUFEND =       CHAR *


INCLUDE FILES:
--------------
  STDTYP     - STANDARD TYPE DEFINITIONS
  BITS       - INCLUDE FILE FOR BIT MANIPULATION ROUTINES
  SCREEN     - INTERNAL SCREEN DEFINITIONS
  FUNCTS     - FUNCTION DEFINITIONS
  CTLCHR     - CONTROL CHARACTERS
  DEVICE     - PHYSICAL DEVICE DATA STRUCTURE
```

VIRTUAL TERMINAL Module Documentation

NAME: BLDMSG/REDOFF
PURPOSE: READ FLAG TURNED OFF
LANGUAGE: C
MODULE TYPE: SUBROUTINE
FUNCTION TYPE: VOID ()
SOURCE FILE: BLDMSG
SOURCE FILE TYPE: .C
HOST:
SUBSYSTEM: UI
SUBDIRECTORY: DRIVER
DOCUMENTATION GROUP: VIRTERM

DESCRIPTION:

SYNOPSIS

```
STATIC VOID REDOFF(WNDPT)
  REGISTER WND  *WNDPT;
```

INPUTS/OUTPUTS:

INPUTS:
WNDPT - POINTER TO WINDOW FROM WHICH DATA WAS READ

OUTPUTS:
NONE

DESCRIPTION

THIS MODULE TURNS OFF ALL READ FLAGS OF CHILD WINDOWS AND FIELDS WHOSE DATA HAS BEEN PUT IN FORMATED MESSAGE(TO BE SENT ACROSS NTM TO MONITOR) OF WINDOW POINTED TO BY WNDPT

ARGUMENTS:

WNDPT = WND *

INCLUDE FILES:

STDTYP	- STANDARD TYPE DEFINITIONS
BITS	- INCLUDE FILE FOR BIT MANIPULATION ROUTINES
SCREEN	- INTERNAL SCREEN DEFINITIONS
FUNCTS	- FUNCTION DEFINITIONS
CTLCHR	- CONTROL CHARACTERS
DEVICE	- PHYSICAL DEVICE DATA STRUCTURE

ROUTINES CALLED:

BLDMSG/REDOFF - READ FLAG TURNED OFF

ROUTINES CALLED:

BLDMSG/BLDBUF - BUILD BUFFER
MEMCPY
STRLEN
SPRINTF

CALLED DIRECTLY BY:

BLDMSG/BLDBUF - BUILD BUFFER
BLDMSG - BUILD MESSAGE

USED IN MAIN PROGRAM(S):

DRIVER/MAI - MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER

CALLED DIRECTLY BY:

BLDMSG/REDOFF - READ FLAG TURNED OFF
BLDMSG - BUILD MESSAGE

USED IN MAIN PROGRAM(S):

DRIVER/MAI - MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER

VIRTUAL TERMINAL Module Documentation

```
NAME:                   BVTIDS
PURPOSE:                BUILD VTI DATA STRUCTURE
LANGUAGE:               C
MODULE TYPE:            FUNCTION
FUNCTION TYPE:          BOOL ()
SOURCE FILE:            BVTIDS
SOURCE FILE TYPE:       .C
HOST:
SUBSYSTEM:              UI
SUBDIRECTORY:           DRIVER
DOCUMENTATION GROUP:    VIRTERM

DESCRIPTION:
------------

  SYNOPSIS
     BOOL BVTIDS()


     INPUTS/OUTPUTS:


     INPUTS:
       NONE

     OUTPUTS:
       RETURNS SUCCESS/FAILURE

  DESCRIPTION
     THIS MODULE (AND STATIC SUBMODULES) BUILDS THE VTI FIELD
                    MAP USED BY
     VIRTUAL TERMINAL TO PAINT SCREEN ON TERMINAL(DEVICE) FROM
                    THE INTERNAL
     DATA STRUCTURE.


INCLUDE FILES:
--------------
  STDTYP      - STANDARD TYPE DEFINITIONS
  BITS        - INCLUDE FILE FOR BIT MANIPULATION ROUTINES
  FUNCTS      - FUNCTION DEFINITIONS
  SCREEN      - INTERNAL SCREEN DEFINITIONS
  DEVICE      - PHYSICAL DEVICE DATA STRUCTURE


ROUTINES CALLED:
----------------
  BLDCMD
  PRCCMDS     - PROCESS COMMAND
  BVTIDS/CLRFLG - CLEAR FLAGS
  ROW
  COL
  ABSPOS      - ABSOLUTIZE CURSOR POSITION OF FIELD
```

MAX
STRASN
MEMCMP
BVTIDS/RVTIFM - REBUILD VTI FIELD MAP

CALLED DIRECTLY BY:

BLDMSG - BUILD MESSAGE
PUTVT - PUT DATA TO VIRTUAL TERMINAL

USED IN MAIN PROGRAM(S):

DRIVER/MAI - MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER

VIRTUAL TERMINAL Module Documentation

NAME: BVTIDS/BVTIFM
PURPOSE: BUILD VTI FIELD MAP
LANGUAGE: C
MODULE TYPE: FUNCTION
FUNCTION TYPE: BOOL ()
SOURCE FILE: BVTIDS
SOURCE FILE TYPE: .C
HOST:
SUBSYSTEM: UI
SUBDIRECTORY: DRIVER
DOCUMENTATION GROUP: VIRTERM

DESCRIPTION:

DESCRIPTION
TRAVERSES THE INTERNAL STRUCTURE ADDING WINDOWS AND FIELDS TO THE
FIELD MAP

ARGUMENTS:

WNDPT = WND *
BNDRY = INT []

INCLUDE FILES:

STDTYP - STANDARD TYPE DEFINITIONS
BITS - INCLUDE FILE FOR BIT MANIPULATION ROUTINES
FUNCTS - FUNCTION DEFINITIONS
SCREEN - INTERNAL SCREEN DEFINITIONS
DEVICE - PHYSICAL DEVICE DATA STRUCTURE

ROUTINES CALLED:

BVTIDS/BVTIFM - BUILD VTI FIELD MAP
BVTIDS/INSFLD - INSERT FIELD
MALLOC

CALLED DIRECTLY BY:

BVTIDS/RVTIFM - REBUILD VTI FIELD MAP
BVTIDS/BVTIFM - BUILD VTI FIELD MAP

USED IN MAIN PROGRAM(S):

DRIVER/MAI - MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER

VIRTUAL TERMINAL Module Documentation

NAME: BVTIDS/CLRFLG
PURPOSE: CLEAR FLAGS
LANGUAGE: C
MODULE TYPE: SUBROUTINE
FUNCTION TYPE: VOID ()
SOURCE FILE: BVTIDS
SOURCE FILE TYPE: .C
HOST:
SUBSYSTEM: UI
SUBDIRECTORY: DRIVER
DOCUMENTATION GROUP: VIRTERM

DESCRIPTION:

DESCRIPTION
THIS MODULE CLEARS ALL FORMAT CHANGE AND CHANGE OUTPUT FLAGS

ARGUMENTS:

WNDPT = WND *

INCLUDE FILES:

STDTYP	- STANDARD TYPE DEFINITIONS
BITS	- INCLUDE FILE FOR BIT MANIPULATION ROUTINES
FUNCTS	- FUNCTION DEFINITIONS
SCREEN	- INTERNAL SCREEN DEFINITIONS
DEVICE	- PHYSICAL DEVICE DATA STRUCTURE

ROUTINES CALLED:

BVTIDS/CLRFLG - CLEAR FLAGS

CALLED DIRECTLY BY:

BVTIDS/CLRFLG - CLEAR FLAGS
BVTIDS - BUILD VTI DATA STRUCTURE

USED IN MAIN PROGRAM(S):

DRIVER/MAI - MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER

VIRTUAL TERMINAL Module Documentation

NAME: BVTIDS/CVTIFM
PURPOSE: CLEAR VTI FIELD MAP
LANGUAGE: C
MODULE TYPE: FUNCTION
FUNCTION TYPE: BOOL ()
SOURCE FILE: BVTIDS
SOURCE FILE TYPE: .C
HOST:
SUBSYSTEM: UI
SUBDIRECTORY: DRIVER
DOCUMENTATION GROUP: VIRTERM

DESCRIPTION:

DESCRIPTION
REMOVES ALL OLD VTI FIELDS FROM THE MAP AND FREES THEM

INCLUDE FILES:

STDTYP	- STANDARD TYPE DEFINITIONS
BITS	- INCLUDE FILE FOR BIT MANIPULATION ROUTINES
FUNCTS	- FUNCTION DEFINITIONS
SCREEN	- INTERNAL SCREEN DEFINITIONS
DEVICE	- PHYSICAL DEVICE DATA STRUCTURE

ROUTINES CALLED:

STRASN
MALLOC
FREE

CALLED DIRECTLY BY:

BVTIDS/RVTIFM - REBUILD VTI FIELD MAP

USED IN MAIN PROGRAM(S):

DRIVER/MAI - MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER

VIRTUAL TERMINAL Module Documentation

NAME: BVTIDS/INSFLD
PURPOSE: INSERT FIELD
LANGUAGE: C
MODULE TYPE: FUNCTION
FUNCTION TYPE: BOOL ()
SOURCE FILE: BVTIDS
SOURCE FILE TYPE: .C
HOST:
SUBSYSTEM: UI
SUBDIRECTORY: DRIVER
DOCUMENTATION GROUP: VIRTERM

DESCRIPTION:

DESCRIPTION
INSERTS A FIELD (OR WINDOW) INTO THE FIELD MAP TAKING CARE TO TRUNCATE,
SPLIT, ORREMOVE FIELDS ALREADY IN THE FIELD MAP WHICH ARE PARTIALLY OR
TOTALLY OBSCURED BY THE NEW FIELD. NOTE THAT THIS ASSUMES FIELDS ARE
INSERTED IN A BACK-TO-FRONT ORDER.

ARGUMENTS:

IVTIPT = VTIFLD *
WBNDRY = INT []

INCLUDE FILES:

STDTYP - STANDARD TYPE DEFINITIONS
BITS - INCLUDE FILE FOR BIT MANIPULATION ROUTINES
FUNCTS - FUNCTION DEFINITIONS
SCREEN - INTERNAL SCREEN DEFINITIONS
DEVICE - PHYSICAL DEVICE DATA STRUCTURE

ROUTINES CALLED:

STRASN
MALLOC
FREE
MIN
MAX

CALLED DIRECTLY BY:

BVTIDS/BVTIFM - BUILD VTI FIELD MAP

USED IN MAIN PROGRAM(S):

DRIVER/MAI - MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER

VIRTUAL TERMINAL Module Documentation

NAME: CLRMOD
PURPOSE: CLEAR MODIFY FLAGS
LANGUAGE: C
MODULE TYPE: SUBROUTINE
FUNCTION TYPE: VOID ()
SOURCE FILE: CLRMOD
SOURCE FILE TYPE: .C
HOST:
SUBSYSTEM: UI
SUBDIRECTORY: DRIVER
DOCUMENTATION GROUP: VIRTERM

DESCRIPTION:

SYNOPSIS
VOID CLRMOD()

DESCRIPTION
CLEARS ALL THE MODIFY FLAGS IN THE INTERNAL SCREEN

INCLUDE FILES:

STDTYP - STANDARD TYPE DEFINITIONS
BITS - INCLUDE FILE FOR BIT MANIPULATION ROUTINES
SCREEN - INTERNAL SCREEN DEFINITIONS

ROUTINES CALLED:

CBIT

CALLED DIRECTLY BY:

GETVT - GET DATA FROM VIRTUAL TERMINAL
PUTVT - PUT DATA TO VIRTUAL TERMINAL

USED IN MAIN PROGRAM(S):

DRIVER/MAI - MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER

VIRTUAL TERMINAL Module Documentation

NAME: BVTIDS/RVTIFM
PURPOSE: REBUILD VTI FIELD MAP
LANGUAGE: C
MODULE TYPE: FUNCTION
FUNCTION TYPE: BOOL ()
SOURCE FILE: BVTIDS
SOURCE FILE TYPE: .C
HOST:
SUBSYSTEM: UI
SUBDIRECTORY: DRIVER
DOCUMENTATION GROUP: VIRTERM

DESCRIPTION:

DESCRIPTION
REBUILD VTI FIELD MAP

INCLUDE FILES:

STDTYP	- STANDARD TYPE DEFINITIONS
BITS	- INCLUDE FILE FOR BIT MANIPULATION ROUTINES
FUNCTS	- FUNCTION DEFINITIONS
SCREEN	- INTERNAL SCREEN DEFINITIONS
DEVICE	- PHYSICAL DEVICE DATA STRUCTURE

ROUTINES CALLED:

BVTIDS/BVTIFM - BUILD VTI FIELD MAP
BVTIDS/CVTIFM - CLEAR VTI FIELD MAP

CALLED DIRECTLY BY:

BVTIDS - BUILD VTI DATA STRUCTURE

USED IN MAIN PROGRAM(S):

DRIVER/MAI - MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER

VIRTUAL TERMINAL Module Documentation

```
NAME:                   DEFFLD
PURPOSE:                DEFINE FIELD
LANGUAGE:               C
MODULE TYPE:            FUNCTION
FUNCTION TYPE:          BOOL ()
SOURCE FILE:            DEFFLD
SOURCE FILE TYPE:       .C
HOST:
SUBSYSTEM:              UI
SUBDIRECTORY:           DRIVER
DOCUMENTATION GROUP:    VIRTERM

DESCRIPTION:
------------

  SYNOPSIS
     BOOL DEFFLD(CMD,PTR)
       STRUCT COMMAND *CMD;
       CHAR           *PTR;


     INPUTS/OUTPUTS:


     INPUTS:
       CMD - ADDRESS OF COMMAND STRUCTURE USED TO MODIFY DATA
                     STRUCTURE
       PTR - POINTS TO END OF MESSAGE BUFFER BEING PROCESSED

     OUTPUTS:
       PTR - WILL POINT TO END PROCESSED DATA IN BUFFER
       RETURNS SUCCESS / FAILURE

  DESCRIPTION
     THIS MODULE USING DATA IN COMMAND STRUCTURE AS WELL AS
                     DATA STILL IN
     MESSAGE BUFFER MODIFIES INTERNAL DATA STRUCTURE OF FIELD
                     SPECIFIED BY
     CURENT WNDOW AND ROW AND COL OF FIELD FIELD BEING DEFINED
                     - IF NO FIELD
     IS FOUND TO MODIFY THEN ONE IS CREATED.

ARGUMENTS:
----------
  CMD =         STRUCT COMMAND *
  PTR =         CHAR **


INCLUDE FILES:
--------------
  STDTYP      - STANDARD TYPE DEFINITIONS
  CTYPE       - **** PURPOSE NOT FOUND BY STRIPPER ****
```

```
  BITS        - INCLUDE FILE FOR BIT MANIPULATION ROUTINES
  FUNCTS      - FUNCTION DEFINITIONS
  DEVICE      - PHYSICAL DEVICE DATA STRUCTURE
```

ROUTINES CALLED:

```
  CALLOC
  MALLOC
  MEMSET
  ISPRINT
```

CALLED DIRECTLY BY:

```
  PUTVT       - PUT DATA TO VIRTUAL TERMINAL
```

USED IN MAIN PROGRAM(S):

```
  DRIVER/MAI - MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER
```

VIRTUAL TERMINAL Module Documentation

```
NAME:                   DEFWND
PURPOSE:                DEFINE WINDOW
LANGUAGE:               C
MODULE TYPE:            FUNCTION
FUNCTION TYPE:          BOOL ()
SOURCE FILE:            DEFWND
SOURCE FILE TYPE:       .C
HOST:
SUBSYSTEM:              UI
SUBDIRECTORY:           DRIVER
DOCUMENTATION GROUP:    VIRTERM

DESCRIPTION:
------------

  SYNOPSIS
     BOOL DEFWND(CMD)
       STRUCT COMMAND *CMD;


     INPUTS/OUTPUTS:


     INPUTS:
       CMD - ADDRESS OF COMMAND STRUCTURE USED TO MODIFY DATA
                     STRUCTURE

     OUTPUTS:
       RETURNS SUCCESS / FAILURE

  DESCRIPTION
     THIS MODULE USING DATA IN COMMAND STRUCTURE MODIFIES
                     INTERNAL DATA
     STRUCTURE OF WINDOW  SPECIFIED BY CURENT WNDOW AND WNDID
                     OF WINDOW
     BEING DEFINED - IF NO WINDOW  IS FOUND TO MODIFY THEN ONE
                     IS CREATED

ARGUMENTS:
----------
  CMD =        STRUCT COMMAND *


INCLUDE FILES:
--------------
  STDTYP      - STANDARD TYPE DEFINITIONS
  BITS        - INCLUDE FILE FOR BIT MANIPULATION ROUTINES
  FUNCTS      - FUNCTION DEFINITIONS
  DEVICE      - PHYSICAL DEVICE DATA STRUCTURE
```

ROUTINES CALLED:

FNDWND	- FIND WINDOW
CALLOC	
MAX	
MIN	
STFMTF	- SET FORMAT FLAG FOR ALL CHILDREN WINDOWS AND FIELDS

CALLED DIRECTLY BY:

PUTVT	- PUT DATA TO VIRTUAL TERMINAL

USED IN MAIN PROGRAM(S):

DRIVER/MAI	- MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER

VIRTUAL TERMINAL Module Documentation

NAME: DOSCR/ERASE
PURPOSE: ERASE PART OF SCREEN
LANGUAGE: C
MODULE TYPE: SUBROUTINE
FUNCTION TYPE: VOID ()
SOURCE FILE: DOSCR
SOURCE FILE TYPE: .C
HOST:
SUBSYSTEM: UI
SUBDIRECTORY: DRIVER
DOCUMENTATION GROUP: VIRTERM

DESCRIPTION:

ARGUMENTS:

LO = INT
HI = INT

INCLUDE FILES:

STDTYP - STANDARD TYPE DEFINITIONS
BITS - INCLUDE FILE FOR BIT MANIPULATION ROUTINES
FUNCTS - FUNCTION DEFINITIONS
SCREEN - INTERNAL SCREEN DEFINITIONS

ROUTINES CALLED:

SBIT
COL
TBIT
CBIT
STRASN

CALLED DIRECTLY BY:

DOSCR/HSCR - HORIZONTAL SCROLL
DOSCR/VSCR - VERTICAL SCROLL
DOSCREEN - DO COMMAND TO INTERNAL SCREEN

USED IN MAIN PROGRAM(S):

DRIVER/MAI - MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER

VIRTUAL TERMINAL Module Documentation

NAME: DOSCR/HSCR
PURPOSE: HORIZONTAL SCROLL
LANGUAGE: C
MODULE TYPE: SUBROUTINE
FUNCTION TYPE: VOID ()
SOURCE FILE: DOSCR
SOURCE FILE TYPE: .C
HOST:
SUBSYSTEM: UI
SUBDIRECTORY: DRIVER
DOCUMENTATION GROUP: VIRTERM

DESCRIPTION:

ARGUMENTS:

POS = INT
DIR = INT
N = INT*

INCLUDE FILES:

STDTYP - STANDARD TYPE DEFINITIONS
BITS - INCLUDE FILE FOR BIT MANIPULATION ROUTINES
FUNCTS - FUNCTION DEFINITIONS
SCREEN - INTERNAL SCREEN DEFINITIONS

ROUTINES CALLED:

DOSCR/ERASE - ERASE PART OF SCREEN
MIN
COL
TBIT

CALLED DIRECTLY BY:

DOSCREEN - DO COMMAND TO INTERNAL SCREEN

USED IN MAIN PROGRAM(S):

DRIVER/MAI - MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER

VIRTUAL TERMINAL Module Documentation

NAME: DOSCR/VSCR
PURPOSE: VERTICAL SCROLL
LANGUAGE: C
MODULE TYPE: SUBROUTINE
FUNCTION TYPE: VOID ()
SOURCE FILE: DOSCR
SOURCE FILE TYPE: .C
HOST:
SUBSYSTEM: UI
SUBDIRECTORY: DRIVER
DOCUMENTATION GROUP: VIRTERM

DESCRIPTION:

ARGUMENTS:

POS = INT
N = INT

INCLUDE FILES:

STDTYP - STANDARD TYPE DEFINITIONS
BITS - INCLUDE FILE FOR BIT MANIPULATION ROUTINES
FUNCTS - FUNCTION DEFINITIONS
SCREEN - INTERNAL SCREEN DEFINITIONS

ROUTINES CALLED:

SBIT
MAX
DOSCR/ERASE - ERASE PART OF SCREEN
ROW
MIN
COL
CBIT
TBIT

CALLED DIRECTLY BY:

DOSCREEN - DO COMMAND TO INTERNAL SCREEN

USED IN MAIN PROGRAM(S):

DRIVER/MAI - MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER

VIRTUAL TERMINAL Module Documentation

```
NAME:                   DOSCREEN
PURPOSE:                DO COMMAND TO INTERNAL SCREEN
LANGUAGE:               C
MODULE TYPE:            FUNCTION
FUNCTION TYPE:          INT ()
SOURCE FILE:            DOSCR
SOURCE FILE TYPE:       .C
HOST:
SUBSYSTEM:              UI
SUBDIRECTORY:           DRIVER
DOCUMENTATION GROUP:    VIRTERM

DESCRIPTION:
------------

  SYNOPSIS
     INT DOSCREEN(CMD)
        STRUCT COMMAND *CMD;

  DESCRIPTION
     EXECUTES CMD ON THE INTERNAL SCREEN AND FIXES UP ITS
                      PARAMETERS.
     RETURNS -1 FOR ERRORS, 0 FOR NO ACTION, 1 FOR NORMAL
                      COMMAND, AND 2 FOR
     MOVE THE CURSOR AND RETRY.

ARGUMENTS:
----------
  CMD =         STRUCT COMMAND *


INCLUDE FILES:
--------------
  STDTYP      - STANDARD TYPE DEFINITIONS
  BITS        - INCLUDE FILE FOR BIT MANIPULATION ROUTINES
  FUNCTS      - FUNCTION DEFINITIONS
  SCREEN      - INTERNAL SCREEN DEFINITIONS


ROUTINES CALLED:
----------------
  TBIT
  CBIT
  FFBSA
  DOSCR/HSCR - HORIZONTAL SCROLL
  COL
  MAX
  FFBSB
  ROW
  DOSCR/VSCR - VERTICAL SCROLL
  DOSCR/ERASE - ERASE PART OF SCREEN
  FIX
  LIMIT
```

POS
CABIT
FLOOR
SBIT
ZERO

CALLED DIRECTLY BY:

PRCCMDS - PROCESS COMMAND
TRMGET - TERMINAL GET

USED IN MAIN PROGRAM(S):

DRIVER/MAI - MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER

VIRTUAL TERMINAL Module Documentation

NAME: DRIVER/MAIN
PURPOSE: MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER
LANGUAGE: C
MODULE TYPE: FUNCTION
FUNCTION TYPE: INT ()
SOURCE FILE: DRIVER
SOURCE FILE TYPE: .C
HOST:
SUBSYSTEM: UI
SUBDIRECTORY: DEVDRV
DOCUMENTATION GROUP: VIRTERM

DESCRIPTION:

SYNOPSIS
MAIN()

DESCRIPTION
THIS IS THE MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER. IT SITS
IN A POOLING LOOP GETTING MESSAGES FOM NTN AND PROCESSING THEM AND
GETTING TERMINAL INPUT AND PROCESSING THAT. WHEN RUN, THREE OPTIONAL
ARGUMENTS MAY BE SPECIFIED FOR SCRIPTING: -W<FILE> TO WRITE A SCRIPT
FILE, -R<FILE> TO READ A SCRIPT FILE, AND -S<FILE> TO SAVE OUTPUT IN A
FILE.

ARGUMENTS:

ARGC = INT
ARGV = CHAR * []

INCLUDE FILES:

STDTYP - STANDARD TYPE DEFINITIONS
STDIO - **** PURPOSE NOT FOUND BY STRIPPER ****
TERMIO - TRANSPARENT TERMINAL I/O DEFINITIONS
DEVICE - PHYSICAL DEVICE DATA STRUCTURE
DEVINI - DEVICE INITIALIZATIONS
NTM - NTM INTERFACE INCLUDE FILE
BITS - INCLUDE FILE FOR BIT MANIPULATION ROUTINES
FUNCTS - FUNCTION DEFINITIONS
SCREEN - INTERNAL SCREEN DEFINITIONS
CTLCHR - CONTROL CHARACTERS
SIGNAL - **** PURPOSE NOT FOUND BY STRIPPER ****
TRMRTN - TERMINAL (DEVICE DRIVER) ROUTINES

ROUTINES CALLED:

BLDCMD	
TVTPRC	- TERMINATE VTI PROCESS
INITEX	
MEMCMP	
PUTVT	- PUT DATA TO VIRTUAL TERMINAL
FPRINTF	
PRINTF	
TRMNAT	
EXIT	
INTVT	- INITIALIZE VIRTUAL TERMINAL
CALLOC	
MALLOC	
FATAL	- REPORT FATAL ERROR
DELAY	
TRMVT	- TERMINATE VIRTUAL TERMINAL
RCV	
TRMCHK	- TERMINAL CHECK
GETVT	- GET DATA FROM VIRTUAL TERMINAL
SIGNAL	
MEMCPY	
STRCPY	
FREE	
STRCAT	
SPRINTF	
STRLEN	
NSEND	
FWRITE	
MI.I	
PUTC	
FCLOSE	
FSEARCH	
FOPEN	
PRCCMDS	- PROCESS COMMAND
TOLOWER	

VIRTUAL TERMINAL Module Documentation

```
NAME:                   ERAWND
PURPOSE:                ERASE WINDOW
LANGUAGE:               C
MODULE TYPE:            SUBROUTINE
FUNCTION TYPE:          VOID ()
SOURCE FILE:            ERAWND
SOURCE FILE TYPE:       .C
HOST:
SUBSYSTEM:              UI
SUBDIRECTORY:           DRIVER
DOCUMENTATION GROUP:    VIRTERM

DESCRIPTION:
------------

  SYNOPSIS
     VOID ERAWND(WNDPT)
        WND *WNDPT;


     INPUTS/OUTPUTS:


     INPUTS:
       WNDPT - POINTER TO WINDOW WISH TO FREE

     OUTPUTS:
       NONE

  DESCRIPTION
     THIS MODULE FREES ALL WINDOW'S CHILDREN WINDOWS AS WELL
                      AS ALL
     DEPENDENT FIELDS.

ARGUMENTS:
----------
  WNDPT =         WND *


INCLUDE FILES:
--------------
  STDTYP      - STANDARD TYPE DEFINITIONS
  BITS        - INCLUDE FILE FOR BIT MANIPULATION ROUTINES
  DEVICE      - PHYSICAL DEVICE DATA STRUCTURE


ROUTINES CALLED:
----------------
  ERAWND      - ERASE WINDOW
  FREE
```

CALLED DIRECTLY BY:

ERAWND	- ERASE WINDOW
PUTVT	- PUT DATA TO VIRTUAL TERMINAL
RMVWND	- REMOVE WINDOW

USED IN MAIN PROGRAM(S):

DRIVER/MAI - MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER

VIRTUAL TERMINAL Module Documentation

```
NAME:                   FATAL
PURPOSE:                REPORT FATAL ERROR
LANGUAGE:               C
MODULE TYPE:            SUBROUTINE
FUNCTION TYPE:          VOID ()
SOURCE FILE:            FATAL
SOURCE FILE TYPE:       .C
HOST:
SUBSYSTEM:              UI
SUBDIRECTORY:           DRIVER
DOCUMENTATION GROUP:    VIRTERM

DESCRIPTION:
------------

  SYNOPSIS
     VOID FATAL(MSG)
        CHAR MSG[];

     INPUTS:
        MSG - ERROR MESSAGE TO BE DISPLAYED (ERROR - %S\N)


  DESCRIPTION
     DISPLAYS THE SPECIFIED ERROR MESSAGE AND EXITS.

ARGUMENTS:
----------
  MSG =         CHAR []


INCLUDE FILES:
--------------
  STDTYP      - STANDARD TYPE DEFINITIONS
  STDIO       - **** PURPOSE NOT FOUND BY STRIPPER ****


ROUTINES CALLED:
----------------
  TVTPRC      - TERMINATE VTI PROCESS
  PRINTF


CALLED DIRECTLY BY:
-------------------
  DRIVER/MAI - MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER


USED IN MAIN PROGRAM(S):
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  DRIVER/MAI - MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER
```

VIRTUAL TERMINAL Module Documentation

NAME: FNDWND
PURPOSE: FIND WINDOW
LANGUAGE: C
MODULE TYPE: FUNCTION
FUNCTION TYPE: WND * ()
SOURCE FILE: FNDWND
SOURCE FILE TYPE: .C
HOST:
SUBSYSTEM: UI
SUBDIRECTORY: DRIVER
DOCUMENTATION GROUP: VIRTERM

DESCRIPTION:

SYNOPSIS

```
WND *FNDWND(WNDID,FWNDPT)
  REGISTER INT WNDID;
  REGISTER WND *FWNDPT;
```

INPUTS/OUTPUTS:

INPUTS:
WNDID - ID OF WINDOW SEARCHING FOR
FWNDPT - POINTER TO FIRST WNDOW IN LIST TO BE SEARCHED

OUTPUTS:
RETURNS A POINTER TO WINDOW FOUND OR A NULL

DESCRIPTION
THIS MODULE SEARCHES FOR A WNDOW WITH THE ID GIVEN AND EITHER RETURNS
A POINTER TO THE WINDOW FOUND OR A NULL.

ARGUMENTS:

WNDID = INT
FWNDPT = WND *

INCLUDE FILES:

STDTYP - STANDARD TYPE DEFINITIONS
DEVICE - PHYSICAL DEVICE DATA STRUCTURE

ROUTINES CALLED:

FNDWND - FIND WINDOW

CALLED DIRECTLY BY:

DEFWND	- DEFINE WINDOW
FNDWND	- FIND WINDOW
PUTVT	- PUT DATA TO VIRTUAL TERMINAL
RMVWND	- REMOVE WINDOW

USED IN MAIN PROGRAM(S):

DRIVER/MAI - MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER

VIRTUAL TERMINAL Module Documentation

```
NAME:                   GETVT
PURPOSE:                GET DATA FROM VIRTUAL TERMINAL
LANGUAGE:               C
MODULE TYPE:            SUBROUTINE
FUNCTION TYPE:          VOID ()
SOURCE FILE:            GETVT
SOURCE FILE TYPE:       .C
HOST:
SUBSYSTEM:              UI
SUBDIRECTORY:           DRIVER
DOCUMENTATION GROUP:    VIRTERM
```

DESCRIPTION:

SYNOPSIS

```
VOID GETVT(BUFF, MAXLEN, LEN)
   CHAR *BUFF;
   INT *MAXLEN, *LEN;
```

DESCRIPTION

PERFORMS A READ FROM THE VIRTUAL TERMINAL. IF IN FORMS MODE, BUFF WILL CONTAIN A FORMATTED SCREEN, OTHERWISE IT WILL CONSIST OF ALL THE PRINTABLE CHARACTERS ENTERED PRIOR TO A COMMAND; IF IN CONTROL TRANSFER MODE, THE COMMAND WILL ALSO BE STORED. MAXLEN IS THE LENGTH OF BUFF, LEN IS THE NUMBER OF CHARACTER READ IN.

ARGUMENTS:

```
BUFF =        CHAR *
MAXLEN =        INT *
LEN =         INT *
```

INCLUDE FILES:

```
STDTYP      - STANDARD TYPE DEFINITIONS
BITS        - INCLUDE FILE FOR BIT MANIPULATION ROUTINES
FUNCTS      - FUNCTION DEFINITIONS
SCREEN      - INTERNAL SCREEN DEFINITIONS
DEVICE      - PHYSICAL DEVICE DATA STRUCTURE
TRMRTN      - TERMINAL (DEVICE DRIVER) ROUTINES
```

ROUTINES CALLED:

```
BLDCMD
CLRMOD      - CLEAR MODIFY FLAGS
TBIT
```

PVTICMD - PUT VTI COMMAND
TRMGET - TERMINAL GET
PCHVTI - PUT SCREEN CHARACTERS TO VTI DATA STRUCTURE
BLDMSG - BUILD MESSAGE

CALLED DIRECTLY BY:

DRIVER/MAI - MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER

USED IN MAIN PROGRAM(S):

DRIVER/MAI - MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER

VIRTUAL TERMINAL Module Documentation

NAME: GVTICMD
PURPOSE: GET VIRTUAL TERMINAL INTERFACE COMMAND
LANGUAGE: C
MODULE TYPE: SUBROUTINE
FUNCTION TYPE: VOID ()
SOURCE FILE: GVTICMD
SOURCE FILE TYPE: .C
HOST:
SUBSYSTEM: UI
SUBDIRECTORY: DRIVER
DOCUMENTATION GROUP: VIRTERM

DESCRIPTION:

SYNOPSIS

```
VOID GVTICMD(CMD, PTR, END)
   STRUCT COMMAND *CMD;
   CHAR **PTR, *END;
```

DESCRIPTION

PARSES THE NEXT VIRTUAL TERMINAL COMMAND INTO CMD AND UPDATES PTR TO POINT TO THE CHARACTER FOLLOWING IT. END IS A POINTER TO THE CHARACTER FOLLOWING THE END OF THE COMMAND STRING.

ARGUMENTS:

CMD =	STRUCT COMMAND *
PTR =	CHAR **
END =	CHAR *

INCLUDE FILES:

STDTYP	- STANDARD TYPE DEFINITIONS
CTYPE	- **** PURPOSE NOT FOUND BY STRIPPER ****
BITS	- INCLUDE FILE FOR BIT MANIPULATION ROUTINES
FUNCTS	- FUNCTION DEFINITIONS
CTLCHR	- CONTROL CHARACTERS

ROUTINES CALLED:

ISPRINT
ISDIGIT

CALLED DIRECTLY BY:

PUTVT - PUT DATA TO VIRTUAL TERMINAL

USED IN MAIN PROGRAM(S):

DRIVER/MAI - MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER

VIRTUAL TERMINAL Module Documentation

NAME: INTVT
PURPOSE: INITIALIZE VIRTUAL TERMINAL
LANGUAGE: C
MODULE TYPE: SUBROUTINE
FUNCTION TYPE: VOID ()
SOURCE FILE: INTVT
SOURCE FILE TYPE: .C
HOST:
SUBSYSTEM: UI
SUBDIRECTORY: DRIVER
DOCUMENTATION GROUP: VIRTERM

DESCRIPTION:

SYNOPSIS

```
VOID INTVT(TNAME, LEN)
   CHAR *TNAME;
   INT *LEN;
```

DESCRIPTION

OPENS THE VTI FOR THE TERMINAL SPECIFIED BY TNAME. LEN IS THE NUMBER OF CHARACTERS IN TNAME.

ARGUMENTS:

TNAME = CHAR *
LEN = INT *

INCLUDE FILES:

STDTYP	- STANDARD TYPE DEFINITIONS
BITS	- INCLUDE FILE FOR BIT MANIPULATION ROUTINES
SCREEN	- INTERNAL SCREEN DEFINITIONS
FUNCTS	- FUNCTION DEFINITIONS
CTLCHR	- CONTROL CHARACTERS
TRMRTN	- TERMINAL (DEVICE DRIVER) ROUTINES

ROUTINES CALLED:

CSTR	
MALLOC	
FREE	
PUTVT	- PUT DATA TO VIRTUAL TERMINAL
TRMINI	- TERMINAL INITIALIZE

CALLED DIRECTLY BY:

DRIVER/MAI - MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER

USED IN MAIN PROGRAM(S):

DRIVER/MAI - MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER

VIRTUAL TERMINAL Module Documentation

NAME: INVIS
PURPOSE: CHECK FOR INVISIBILITY
LANGUAGE: C
MODULE TYPE: FUNCTION
FUNCTION TYPE: BOOL ()
SOURCE FILE: INVIS
SOURCE FILE TYPE: .C
HOST:
SUBSYSTEM: UI
SUBDIRECTORY: DRIVER
DOCUMENTATION GROUP: VIRTERM

DESCRIPTION:

SYNOPSIS

```
BOOL INVIS(POS)
   INT POS;
```

DESCRIPTION

RETURNS TRUE IF THE CHARACTER AT POSITION POS ON THE INTERNAL SCREEN IS INVISIBLE, FALSE OTHERWISE.

ARGUMENTS:

POS = INT

INCLUDE FILES:

STDTYP	- STANDARD TYPE DEFINITIONS
BITS	- INCLUDE FILE FOR BIT MANIPULATION ROUTINES
SCREEN	- INTERNAL SCREEN DEFINITIONS

ROUTINES CALLED:

TBIT

CALLED DIRECTLY BY:

REFRESH	- REFRESH TERMINAL
SLINEND	- FIND SCREEN LINE END

USED IN MAIN PROGRAM(S):

DRIVER/MAI - MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER

VIRTUAL TERMINAL Module Documentation

```
NAME:                   PCHVTI
PURPOSE:                PUT SCREEN CHARACTERS TO VTI DATA
                        STRUCTURE
LANGUAGE:               C
MODULE TYPE:            FUNCTION
FUNCTION TYPE:          BOOL ()
SOURCE FILE:            PCHVTI
SOURCE FILE TYPE:       .C
HOST:
SUBSYSTEM:              UI
SUBDIRECTORY:           DRIVER
DOCUMENTATION GROUP:    VIRTERM

DESCRIPTION:
------------

  SYNOPSIS
     BOOL PCHVTI()


     INPUTS/OUTPUTS:


     INPUTS:
       NONE
     OUTPUTS:
       RETURNS FAILURE/SUCCESS

  DESCRIPTION
     THIS MODULE TAKES VT DATA IN "SCREEN" BUFFER AND PUTS IT
                      INTO
     VTI INTERNAL DATA STRUCTURE


INCLUDE FILES:
--------------
  STDTYP      - STANDARD TYPE DEFINITIONS
  BITS        - INCLUDE FILE FOR BIT MANIPULATION ROUTINES
  SCREEN      - INTERNAL SCREEN DEFINITIONS
  FUNCTS      - FUNCTION DEFINITIONS
  DEVICE      - PHYSICAL DEVICE DATA STRUCTURE


ROUTINES CALLED:
----------------
  TBIT
  ABSPOS      - ABSOLUTIZE CURSOR POSITION OF FIELD
  MAX
```

CALLED DIRECTLY BY:

GETVT	- GET DATA FROM VIRTUAL TERMINAL
PUTVT	- PUT DATA TO VIRTUAL TERMINAL

USED IN MAIN PROGRAM(S):

DRIVER/MAI - MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER

VIRTUAL TERMINAL Module Documentation

```
NAME:                   PRCCMDS
PURPOSE:                PROCESS COMMAND
LANGUAGE:               C
MODULE TYPE:            SUBROUTINE
FUNCTION TYPE:          VOID ()
SOURCE FILE:            PRCCMDS
SOURCE FILE TYPE:       .C
HOST:
SUBSYSTEM:              UI
SUBDIRECTORY:           DRIVER
DOCUMENTATION GROUP:    VIRTERM

DESCRIPTION:
------------

  SYNOPSIS
    VOID PRCCMDS(CMD)
    STRUCT COMMAND *CMD;


     INPUTS/OUTPUTS:


     INPUTS:
       CMD - COMMAND TO BE PROCESSED

     OUTPUTS:
       NONE

  DESCRIPTION
     PROCESSES INDIVIDUAL VITTUAL TERMINAL COMMANDS

ARGUMENTS:
----------
  CMD =         STRUCT COMMAND *


INCLUDE FILES:
--------------
  STDTYP      - STANDARD TYPE DEFINITIONS
  TERMIO      - TRANSPARENT TERMINAL I/O DEFINITIONS
  BITS        - INCLUDE FILE FOR BIT MANIPULATION ROUTINES
  FUNCTS      - FUNCTION DEFINITIONS
  SCREEN      - INTERNAL SCREEN DEFINITIONS
  TRMRTN      - TERMINAL (DEVICE DRIVER) ROUTINES


ROUTINES CALLED:
----------------
  BLDCMD
  DOSCREEN    - DO COMMAND TO INTERNAL SCREEN
  TRMPUT      - TERMINAL PUT
```

TBIT
ROW
COL

CALLED DIRECTLY BY:

BVTIDS - BUILD VTI DATA STRUCTURE
DRIVER/MAI - MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER
PUTVT - PUT DATA TO VIRTUAL TERMINAL

USED IN MAIN PROGRAM(S):

DRIVER/MAI - MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER

VIRTUAL TERMINAL Module Documentation

```
NAME:                   PUTVT
PURPOSE:                PUT DATA TO VIRTUAL TERMINAL
LANGUAGE:               C
MODULE TYPE:            SUBROUTINE
FUNCTION TYPE:          VOID ()
SOURCE FILE:            PUTVT
SOURCE FILE TYPE:       .C
HOST:
SUBSYSTEM:              UI
SUBDIRECTORY:           DRIVER
DOCUMENTATION GROUP:    VIRTERM
```

DESCRIPTION:

```
  SYNOPSIS
     VOID PUTVT(BUFF, LEN)
        CHAR *BUFF;
        INT *LEN;

  DESCRIPTION
     PERFORMS A WRITE TO THE VIRTUAL TERMINAL.  LEN IS THE
                     NUMBER OF
     CHARACTERS IN BUFF TO BE WRITTEN.
```

ARGUMENTS:

```
  BUFF =        CHAR *
  LEN =        INT *
```

INCLUDE FILES:

```
  STDTYP      - STANDARD TYPE DEFINITIONS
  TERMIO      - TRANSPARENT TERMINAL I/O DEFINITIONS
  BITS        - INCLUDE FILE FOR BIT MANIPULATION ROUTINES
  FUNCTS      - FUNCTION DEFINITIONS
  SCREEN      - INTERNAL SCREEN DEFINITIONS
  DEVICE      - PHYSICAL DEVICE DATA STRUCTURE
  TRMRTN      - TERMINAL (DEVICE DRIVER) ROUTINES
```

ROUTINES CALLED:

```
  BLDCMD
  FNDWND      - FIND WINDOW
  PRCCMDS     - PROCESS COMMAND
  TBIT
  TRMFLS      - TERMINAL FLUSH
  RMVWND      - REMOVE WINDOW
  DEFWND      - DEFINE WINDOW
  SWNPRC      - SET WINDOW PRECEDENCE
  DEFFLD      - DEFINE FIELD
```

BVTIDS	- BUILD VTI DATA STRUCTURE
ERAWND	- ERASE WINDOW
PCHVTI	- PUT SCREEN CHARACTERS TO VTI DATA STRUCTURE
CLRMOD	- CLEAR MODIFY FLAGS
GVTICMD	- GET VIRTUAL TERMINAL INTERFACE COMMAND
STRDPN	- SET READ PENDING FLAGS

CALLED DIRECTLY BY:

DRIVER/MAI	- MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER
INTVT	- INITIALIZE VIRTUAL TERMINAL
TRMVT	- TERMINATE VIRTUAL TERMINAL

USED IN MAIN PROGRAM(S):

DRIVER/MAI - MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER

VIRTUAL TERMINAL Module Documentation

```
NAME:                   PVTICMD
PURPOSE:                PUT VTI COMMAND
LANGUAGE:               C
MODULE TYPE:            SUBROUTINE
FUNCTION TYPE:          VOID ()
SOURCE FILE:            PVTICMD
SOURCE FILE TYPE:       .C
HOST:
SUBSYSTEM:              UI
SUBDIRECTORY:           DRIVER
DOCUMENTATION GROUP:    VIRTERM
```

DESCRIPTION:

SYNOPSIS

```
VOID PVTICMD(CMD, BUFF, END)
   STRUCT COMMAND *CMD;
   CHAR **BUF, *END;
```

DESCRIPTION

CONVERTS CMD TO CHARACTER FORM AND UPDATE BUFF TO POINT TO THE CHARACTER FOLLOWING THE CONVERTED STRING. END IS A POINTER TO THE CHARACTER FOLLOWING THE BUFFER.

ARGUMENTS:

```
CMD =       STRUCT COMMAND *
BUFF =       CHAR **
END =       CHAR *
```

INCLUDE FILES:

```
STDTYP     - STANDARD TYPE DEFINITIONS
BITS       - INCLUDE FILE FOR BIT MANIPULATION ROUTINES
SCREEN     - INTERNAL SCREEN DEFINITIONS
FUNCTS     - FUNCTION DEFINITIONS
CTLCHR     - CONTROL CHARACTERS
```

ROUTINES CALLED:

```
PVTICMD/PUTNUM - PUT NUMBER
```

CALLED DIRECTLY BY:

```
GETVT      - GET DATA FROM VIRTUAL TERMINAL
```

USED IN MAIN PROGRAM(S):

DRIVER/MAI - MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER

VIRTUAL TERMINAL Module Documentation

NAME: PVTICMD/PUTNUM
PURPOSE: PUT NUMBER
LANGUAGE: C
MODULE TYPE: SUBROUTINE
FUNCTION TYPE: VOID ()
SOURCE FILE: PVTICMD
SOURCE FILE TYPE: .C
HOST:
SUBSYSTEM: UI
SUBDIRECTORY: DRIVER
DOCUMENTATION GROUP: VIRTERM

DESCRIPTION:

ARGUMENTS:

NUM = INT
BUFF = CHAR **
END = CHAR *

INCLUDE FILES:

STDTYP - STANDARD TYPE DEFINITIONS
BITS - INCLUDE FILE FOR BIT MANIPULATION ROUTINES
SCREEN - INTERNAL SCREEN DEFINITIONS
FUNCTS - FUNCTION DEFINITIONS
CTLCHR - CONTROL CHARACTERS

CALLED DIRECTLY BY:

PVTICMD - PUT VTI COMMAND

USED IN MAIN PROGRAM(S):

DRIVER/MAI - MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER

VIRTUAL TERMINAL Module Documentation

NAME: REFRESH
PURPOSE: REFRESH TERMINAL
LANGUAGE: C
MODULE TYPE: SUBROUTINE
FUNCTION TYPE: VOID ()
SOURCE FILE: REFRESH
SOURCE FILE TYPE: .C
HOST:
SUBSYSTEM: UI
SUBDIRECTORY: DRIVER
DOCUMENTATION GROUP: VIRTERM

DESCRIPTION:

SYNOPSIS
VOID REFRESH()

DESCRIPTION
CLEARS THE TERMINAL SCREEN AND REWRITES IT FROM THE INTERNAL SCREEN.

INCLUDE FILES:

STDTYP	- STANDARD TYPE DEFINITIONS
BITS	- INCLUDE FILE FOR BIT MANIPULATION ROUTINES
SCREEN	- INTERNAL SCREEN DEFINITIONS
FUNCTS	- FUNCTION DEFINITIONS
TRMRTN	- TERMINAL (DEVICE DRIVER) ROUTINES

ROUTINES CALLED:

BLDCMD	
INVIS	- CHECK FOR INVISIBILITY
ROW	
COL	
TBIT	
TRMPUT	- TERMINAL PUT
SBIT	
TRMFLS	- TERMINAL FLUSH
CBIT	

CALLED DIRECTLY BY:

TRMPUT	- TERMINAL PUT

USED IN MAIN PROGRAM(S):

DRIVER/MAI - MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER

VIRTUAL TERMINAL Module Documentation

NAME: REFTERM
PURPOSE: REFRESH TERMINAL
LANGUAGE: C
MODULE TYPE: SUBROUTINE
FUNCTION TYPE: VOID ()
SOURCE FILE: REFTERM
SOURCE FILE TYPE: .C
HOST:
SUBSYSTEM: UI
SUBDIRECTORY: DRIVER
DOCUMENTATION GROUP: VIRTERM

DESCRIPTION:

SYNOPSIS

```
VOID REFTERM(MIN, MAX)
   INT MIN, MAX;
```

DESCRIPTION

REFRESHES THE SPECIFIED PORTION OF THE TERMINAL SCREEN FROM THE INTERNAL SCREEN.

ARGUMENTS:

MIN =	INT
MAX =	INT

INCLUDE FILES:

STDTYP	- STANDARD TYPE DEFINITIONS
BITS	- INCLUDE FILE FOR BIT MANIPULATION ROUTINES
SCREEN	- INTERNAL SCREEN DEFINITIONS
FUNCTS	- FUNCTION DEFINITIONS
TRMRTN	- TERMINAL (DEVICE DRIVER) ROUTINES

ROUTINES CALLED:

BLDCMD	
TBIT	
TRMPUT	- TERMINAL PUT
SBIT	
SLINEND	- FIND SCREEN LINE END
CBIT	
COL	
ROW	
MAX	
MIN	

CALLED DIRECTLY BY:

TRMPUT - TERMINAL PUT

USED IN MAIN PROGRAM(S):

DRIVER/MAI - MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER

VIRTUAL TERMINAL Module Documentation

```
NAME:                   RMVWND
PURPOSE:                REMOVE WINDOW
LANGUAGE:               C
MODULE TYPE:            SUBROUTINE
FUNCTION TYPE:          VOID ()
SOURCE FILE:            RMVWND
SOURCE FILE TYPE:       .C
HOST:
SUBSYSTEM:              UI
SUBDIRECTORY:           DRIVER
DOCUMENTATION GROUP:    VIRTERM

DESCRIPTION:
------------

  SYNOPSIS
     VOID RMVWND(WNDID)
       INT WNDID;


     INPUTS/OUTPUTS:


     INPUTS:
       WNDID - ID OF WNDOW WISH TO REMOVE

     OUTPUTS:
       NONE

  DESCRIPTION
     THIS MODULE AFTER CALLING FNDWND TO GET POINTER TO WNDOW
                     INTERESTED IN
     REMOVING, UNLINKS IT FROM DATA STRUCTURE AND CALLS FREWND
                     TO FREE IT
     AND ALL ITS CHILDREN WINDOWS AS WELL AS ALL DEPENDENT
                     FIELDS.

ARGUMENTS:
----------
  WNDID =        INT


INCLUDE FILES:
--------------
  STDTYP      - STANDARD TYPE DEFINITIONS
  BITS        - INCLUDE FILE FOR BIT MANIPULATION ROUTINES
  DEVICE      - PHYSICAL DEVICE DATA STRUCTURE
```

ROUTINES CALLED:

FNDWND	- FIND WINDOW
ERAWND	- ERASE WINDOW
FREE	

CALLED DIRECTLY BY:

PUTVT	- PUT DATA TO VIRTUAL TERMINAL

USED IN MAIN PROGRAM(S):

DRIVER/MAI	- MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER

VIRTUAL TERMINAL Module Documentation

NAME: SLINEND
PURPOSE: FIND SCREEN LINE END
LANGUAGE: C
MODULE TYPE: FUNCTION
FUNCTION TYPE: INT ()
SOURCE FILE: SLINEND
SOURCE FILE TYPE: .C
HOST:
SUBSYSTEM: UI
SUBDIRECTORY: DRIVER
DOCUMENTATION GROUP: VIRTERM

DESCRIPTION:

SYNOPSIS
```
INT SLINEND(POS)
   INT POS;
```

DESCRIPTION
RETURNS THE POSITION OF THE LAST VISIBLE CHARACTER ON THE LINE CONTAINING
THE SPECIFIED POSITION.

ARGUMENTS:

POS = INT

INCLUDE FILES:

STDTYP	- STANDARD TYPE DEFINITIONS
BITS	- INCLUDE FILE FOR BIT MANIPULATION ROUTINES
SCREEN	- INTERNAL SCREEN DEFINITIONS

ROUTINES CALLED:

INVIS	- CHECK FOR INVISIBILITY
COL	

CALLED DIRECTLY BY:

REFTERM	- REFRESH TERMINAL

USED IN MAIN PROGRAM(S):

DRIVER/MAI - MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER

VIRTUAL TERMINAL Module Documentation

NAME: STFMTF
PURPOSE: SET FORMAT FLAG FOR ALL CHILDREN WINDOWS AND FIELDS
LANGUAGE: C
MODULE TYPE: SUBROUTINE
FUNCTION TYPE: VOID ()
SOURCE FILE: STFMTF
SOURCE FILE TYPE: .C
HOST:
SUBSYSTEM: UI
SUBDIRECTORY: DRIVER
DOCUMENTATION GROUP: VIRTERM

DESCRIPTION:

SYNOPSIS

```
VOID STFMTF(WNDPT);
    WND  *WNDPT;
```

INPUTS/OUTPUTS:

INPUTS:
WNDPT - POINTER TO WINDOW SETTING FLAGS FOR

OUTPUTS:
NONE

DESCRIPTION
THIS MODULE SETS ALL FORMAT CHANGE FLAGS FOR WINDOW AND ITS CHILDREN
WINDOWS AND FIELDS

ARGUMENTS:

WNDPT = WND *

INCLUDE FILES:

STDTYP	- STANDARD TYPE DEFINITIONS
BITS	- INCLUDE FILE FOR BIT MANIPULATION ROUTINES
FUNCTS	- FUNCTION DEFINITIONS
DEVICE	- PHYSICAL DEVICE DATA STRUCTURE

ROUTINES CALLED:

STFMTF	- SET FORMAT FLAG FOR ALL CHILDREN WINDOWS AND FIELDS

CALLED DIRECTLY BY:

DEFWND	- DEFINE WINDOW
STFMTF	- SET FORMAT FLAG FOR ALL CHILDREN WINDOWS AND FIELDS
SWNPRC	- SET WINDOW PRECEDENCE

USED IN MAIN PROGRAM(S):

DRIVER/MAI	- MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER

VIRTUAL TERMINAL Module Documentation

NAME: STRDPN
PURPOSE: SET READ PENDING FLAGS
LANGUAGE: C
MODULE TYPE: SUBROUTINE
FUNCTION TYPE: VOID ()
SOURCE FILE: STRDPN
SOURCE FILE TYPE: .C
HOST:
SUBSYSTEM: UI
SUBDIRECTORY: DRIVER
DOCUMENTATION GROUP: VIRTERM

DESCRIPTION:

SYNOPSIS

```
VOID STRDPN(WNDPT)
  REGISTER WND  *WNDPT;
```

INPUTS/OUTPUTS:

INPUTS:
WNDPT - POINTER TO WINDOW FROM WHICH DATA IS TO BE READ

OUTPUTS:
NONE

DESCRIPTION

THIS MODULE TURNS ON ALL READ FLAGS OF CHILD WINDOWS AND FIELDS WHOSE DATA HAS IS TO BE PUT INTO FORMATED MESSAGE(TO BE SENT ACROSS NTM TO MONITOR) OF WINDOW POINTED TO BY WNDPT

ARGUMENTS:

WNDPT = WND *

INCLUDE FILES:

STDTYP - STANDARD TYPE DEFINITIONS
DEVICE - PHYSICAL DEVICE DATA STRUCTURE

ROUTINES CALLED:

STRDPN/STFDRD - SET FIELD READ PENDING

CALLED DIRECTLY BY:

PUTVT - PUT DATA TO VIRTUAL TERMINAL

USED IN MAIN PROGRAM(S):

DRIVER/MAI - MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER

VIRTUAL TERMINAL Module Documentation

NAME: STRDPN/STFDRD
PURPOSE: SET FIELD READ PENDING
LANGUAGE: C
MODULE TYPE: SUBROUTINE
FUNCTION TYPE: VOID ()
SOURCE FILE: STRDPN
SOURCE FILE TYPE: .C
HOST:
SUBSYSTEM: UI
SUBDIRECTORY: DRIVER
DOCUMENTATION GROUP: VIRTERM

DESCRIPTION:

ARGUMENTS:

WNDPT = WND *

INCLUDE FILES:

STDTYP - STANDARD TYPE DEFINITIONS
DEVICE - PHYSICAL DEVICE DATA STRUCTURE

ROUTINES CALLED:

STRDPN/STFDRD - SET FIELD READ PENDING

CALLED DIRECTLY BY:

STRDPN/STFDRD - SET FIELD READ PENDING
STRDPN - SET READ PENDING FLAGS

USED IN MAIN PROGRAM(S):

DRIVER/MAI - MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER

VIRTUAL TERMINAL Module Documentation

```
NAME:                   SWNPRC
PURPOSE:                SET WINDOW PRECEDENCE
LANGUAGE:               C
MODULE TYPE:            SUBROUTINE
FUNCTION TYPE:          VOID ()
SOURCE FILE:            SWNPRC
SOURCE FILE TYPE:       .C
HOST:
SUBSYSTEM:              UI
SUBDIRECTORY:           DRIVER
DOCUMENTATION GROUP:    VIRTERM

DESCRIPTION:
------------

  SYNOPSIS
     VOID SWNPRC(CMD)
       STRUCT COMMAND *CMD;


     INPUTS/OUTPUTS:


     INPUTS:
       CMD - ADDRESS OF COMMAND STRUCTURE USED TO SET
                     PRECEDENCE OF
             WINDOWS

     OUTPUTS:
       NONE

  DESCRIPTION
     THIS MCDULE REORDERS PRECEDENCE OF WINDOWS, TAKING FIRST
                     WINDOW OUT OF
     LIST ANDPUTING IT AT THE HEAD OF THE LIST, THEN TAKING
                     THE NEXT WINDOW
     AND DOING THE SAME TING AND SO ON UNTIL ALL WINDOW PASSED
                     IN COMMAND
     STRUCTURE HAVE BEEN PROCESSED.

ARGUMENTS:
----------
  CMD =        STRUCT COMMAND *


INCLUDE FILES:
--------------
  STDTYP      - STANDARD TYPE DEFINITIONS
  BITS        - INCLUDE FILE FOR BIT MANIPULATION ROUTINES
  FUNCTS      - FUNCTION DEFINITIONS
  DEVICE      - PHYSICAL DEVICE DATA STRUCTURE
```

ROUTINES CALLED:

STFMTF - SET FORMAT FLAG FOR ALL CHILDREN WINDOWS AND FIELDS

CALLED DIRECTLY BY:

PUTVT - PUT DATA TO VIRTUAL TERMINAL

USED IN MAIN PROGRAM(S):

DRIVER/MAI - MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER

VIRTUAL TERMINAL Module Documentation

```
NAME:                   TPUTNUM
PURPOSE:                TERMINAL PUT NUMBER
LANGUAGE:               C
MODULE TYPE:            SUBROUTINE
FUNCTION TYPE:          VOID ()
SOURCE FILE:            TPUTNUM
SOURCE FILE TYPE:       .C
HOST:
SUBSYSTEM:              UI
SUBDIRECTORY:           DRIVER
DOCUMENTATION GROUP:    VIRTERM

DESCRIPTION:
------------

  SYNOPSIS
     VOID TPUTNUM(I, CHAN)
        INT I;
        TERM *CHAN;

  DESCRIPTION
     CONVERTS I TO CHARACTER FORM AND WRITES IT TO THE
                     SPECIFIED TERMINAL.

ARGUMENTS:
----------
  I =         INT
  CHAN =         TERM *


INCLUDE FILES:
--------------
  STDTYP      - STANDARD TYPE DEFINITIONS
  TERMIO      - TRANSPARENT TERMINAL I/O DEFINITIONS


ROUTINES CALLED:
----------------
  TPUTC


CALLED DIRECTLY BY:
-------------------
  VT100/MOVCUR - MOVE CURSOR (INTERNAL)
  VT100/SETATR - SET ATTRIBUTES (INTERNAL)
  TRMPUT       - TERMINAL PUT


USED IN MAIN PROGRAM(S):
------------------------
  DRIVER/MAI - MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER
```

VIRTUAL TERMINAL Module Documentation

NAME: TPUTS
PURPOSE: TERMINAL PUT STRING
LANGUAGE: C
MODULE TYPE: SUBROUTINE
FUNCTION TYPE: VOID ()
SOURCE FILE: TPUTS
SOURCE FILE TYPE: .C
HOST:
SUBSYSTEM: UI
SUBDIRECTORY: DRIVER
DOCUMENTATION GROUP: VIRTERM

DESCRIPTION:

SYNOPSIS

```
VOID TPUTS(S, CHAN)
   CHAR *S;
   TERM *CHAN;
```

DESCRIPTION
WRITES THE SPECIFIED STRING TO THE SPECIFIED TERMINAL.

ARGUMENTS:

S = CHAR *
CHAN = TERM *

INCLUDE FILES:

STDTYP - STANDARD TYPE DEFINITIONS
TERMIO - TRANSPARENT TERMINAL I/O DEFINITIONS

ROUTINES CALLED:

TPUTC

CALLED DIRECTLY BY:

VT100/MOVCUR - MOVE CURSOR (INTERNAL)
VT100/SETATR - SET ATTRIBUTES (INTERNAL)
TRMPUT - TERMINAL PUT
TRMEND - TERMINAL END

USED IN MAIN PROGRAM(S):

DRIVER/MAI - MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER

VIRTUAL TERMINAL Module Documentation

NAME: TRMCHK
PURPOSE: TERMINAL CHECK
LANGUAGE: C
MODULE TYPE: FUNCTION
FUNCTION TYPE: INT ()
SOURCE FILE: VT100
SOURCE FILE TYPE: .C
HOST:
SUBSYSTEM: UI
SUBDIRECTORY: DEVDRV
DOCUMENTATION GROUP: VIRTERM

DESCRIPTION:

SYNOPSIS
INT TRMCHK()

DESCRIPTION
THIS MODULE RETURNS THE NUMBER OF CHARACTERS IN THE TYPE-AHEAD BUFFER.

INCLUDE FILES:

STDIO	- **** PURPOSE NOT FOUND BY STRIPPER ****
STDTYP	- STANDARD TYPE DEFINITIONS
CTYPE	- **** PURPOSE NOT FOUND BY STRIPPER ****
TERMIO	- TRANSPARENT TERMINAL I/O DEFINITIONS
BITS	- INCLUDE FILE FOR BIT MANIPULATION ROUTINES
SCREEN	- INTERNAL SCREEN DEFINITIONS
FUNCTS	- FUNCTION DEFINITIONS
TRMRTN	- TERMINAL (DEVICE DRIVER) ROUTINES
CI600.C"	- **** PURPOSE NOT FOUND BY STRIPPER ****

ROUTINES CALLED:

TCHECK

CALLED DIRECTLY BY:

DRIVER/MAI - MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER

USED IN MAIN PROGRAM(S):

DRIVER/MAI - MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER

VIRTUAL TERMINAL Module Documentation

NAME: TRMEND
PURPOSE: TERMINAL END
LANGUAGE: C
MODULE TYPE: SUBROUTINE
FUNCTION TYPE: VOID ()
SOURCE FILE: VT100
SOURCE FILE TYPE: .C
HOST:
SUBSYSTEM: UI
SUBDIRECTORY: DEVDRV
DOCUMENTATION GROUP: VIRTERM

DESCRIPTION:

SYNOPSIS
VOID TRMEND()

DESCRIPTION
RESETS THE CURRENTLY OPEN TERMINAL AND CLOSES IT.

INCLUDE FILES:

STDIO	- **** PURPOSE NOT FOUND BY STRIPPER ****
STDTYP	- STANDARD TYPE DEFINITIONS
CTYPE	- **** PURPOSE NOT FOUND BY STRIPPER ****
TERMIO	- TRANSPARENT TERMINAL I/O DEFINITIONS
BITS	- INCLUDE FILE FOR BIT MANIPULATION ROUTINES
SCREEN	- INTERNAL SCREEN DEFINITIONS
FUNCTS	- FUNCTION DEFINITIONS
TRMRTN	- TERMINAL (DEVICE DRIVER) ROUTINES
CI600.C"	- **** PURPOSE NOT FOUND BY STRIPPER ****

ROUTINES CALLED:

PRNEND	
TPUTS	- TERMINAL PUT STRING
TCLOSE	

CALLED DIRECTLY BY:

TRMVT	- TERMINATE VIRTUAL TERMINAL

USED IN MAIN PROGRAM(S):

DRIVER/MAI - MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER

VIRTUAL TERMINAL Module Documentation

NAME: TRMFLS
PURPOSE: TERMINAL FLUSH
LANGUAGE: C
MODULE TYPE: SUBROUTINE
FUNCTION TYPE: VOID ()
SOURCE FILE: VT100
SOURCE FILE TYPE: .C
HOST:
SUBSYSTEM: UI
SUBDIRECTORY: DEVDRV
DOCUMENTATION GROUP: VIRTERM

DESCRIPTION:

SYNOPSIS
VOID TRMFLS()

DESCRIPTION
FLUSH ANY TERMINAL BUFFERS.

INCLUDE FILES:

STDIO	- **** PURPOSE NOT FOUND BY STRIPPER ****
STDTYP	- STANDARD TYPE DEFINITIONS
CTYPE	- **** PURPOSE NOT FOUND BY STRIPPER ****
TERMIO	- TRANSPARENT TERMINAL I/O DEFINITIONS
BITS	- INCLUDE FILE FOR BIT MANIPULATION ROUTINES
SCREEN	- INTERNAL SCREEN DEFINITIONS
FUNCTS	- FUNCTION DEFINITIONS
TRMRTN	- TERMINAL (DEVICE DRIVER) ROUTINES
CI600.C"	- **** PURPOSE NOT FOUND BY STRIPPER ****

ROUTINES CALLED:

VT100/MOVCUR - MOVE CURSOR (INTERNAL)
TFLUSH

CALLED DIRECTLY BY:

PUTVT	- PUT DATA TO VIRTUAL TERMINAL
REFRESH	- REFRESH TERMINAL
TRMGET	- TERMINAL GET

USED IN MAIN PROGRAM(S):

DRIVER/MAI - MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER

VIRTUAL TERMINAL Module Documentation

```
NAME:                   TRMGET
PURPOSE:                TERMINAL GET
LANGUAGE:               C
MODULE TYPE:            SUBROUTINE
FUNCTION TYPE:          VOID ()
SOURCE FILE:            VT100
SOURCE FILE TYPE:       .C
HOST:
SUBSYSTEM:              UI
SUBDIRECTORY:           DEVDRV
DOCUMENTATION GROUP:    VIRTERM

DESCRIPTION:
------------
  SYNOPSIS
     VOID TRMGET(CMD)
        STRUCT COMMAND *CMD;

  DESCRIPTION
     GETS THE NEXT COMMAND FROM THE TERMINAL AND CONVERTS IT
                     TO INTERNAL FORM.

ARGUMENTS:
----------
  CMD =         STRUCT COMMAND *


INCLUDE FILES:
--------------
  STDIO       - **** PURPOSE NOT FOUND BY STRIPPER ****
  STDTYP      - STANDARD TYPE DEFINITIONS
  CTYPE       - **** PURPOSE NOT FOUND BY STRIPPER ****
  TERMIO      - TRANSPARENT TERMINAL I/O DEFINITIONS
  BITS        - INCLUDE FILE FOR BIT MANIPULATION ROUTINES
  SCREEN      - INTERNAL SCREEN DEFINITIONS
  FUNCTS      - FUNCTION DEFINITIONS
  TRMRTN      - TERMINAL (DEVICE DRIVER) ROUTINES
  CI600.C"    - **** PURPOSE NOT FOUND BY STRIPPER ****


ROUTINES CALLED:
----------------
  BLDCMD
  PRINTF
  GETCHAR
  TPURGE
  ISPRINT
  TGETC
  DOSCREEN    - DO COMMAND TO INTERNAL SCREEN
  ROW
  COL
  TRMPUT      - TERMINAL PUT
```

TRMFLS - TERMINAL FLUSH
TBIT
ISDIGIT

CALLED DIRECTLY BY:

GETVT - GET DATA FROM VIRTUAL TERMINAL

USED IN MAIN PROGRAM(S):

DRIVER/MAI - MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER

VIRTUAL TERMINAL Module Documentation

NAME: TRMINI
PURPOSE: TERMINAL INITIALIZE
LANGUAGE: C
MODULE TYPE: SUBROUTINE
FUNCTION TYPE: VOID ()
SOURCE FILE: VT100
SOURCE FILE TYPE: .C
HOST:
SUBSYSTEM: UI
SUBDIRECTORY: DEVDRV
DOCUMENTATION GROUP: VIRTERM

DESCRIPTION:

SYNOPSIS

```
VOID TRMINI(TNAME)
   CHAR *TNAME;
```

DESCRIPTION
OPENS THE TERMINAL SPECIFIED BY TNAME AND INITIALIZES IT.

ARGUMENTS:

TNAME = CHAR *

INCLUDE FILES:

STDIO	- **** PURPOSE NOT FOUND BY STRIPPER ****
STDTYP	- STANDARD TYPE DEFINITIONS
CTYPE	- **** PURPOSE NOT FOUND BY STRIPPER ****
TERMIO	- TRANSPARENT TERMINAL I/O DEFINITIONS
BITS	- INCLUDE FILE FOR BIT MANIPULATION ROUTINES
SCREEN	- INTERNAL SCREEN DEFINITIONS
FUNCTS	- FUNCTION DEFINITIONS
TRMRTN	- TERMINAL (DEVICE DRIVER) ROUTINES
CI600.C"	- **** PURPOSE NOT FOUND BY STRIPPER ****

ROUTINES CALLED:

TBOPEN
PRNINI

CALLED DIRECTLY BY:

INTVT	- INITIALIZE VIRTUAL TERMINAL

USED IN MAIN PROGRAM(S):

DRIVER/MAI	- MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER

VIRTUAL TERMINAL Module Documentation

NAME: TRMPUT
PURPOSE: TERMINAL PUT
LANGUAGE: C
MODULE TYPE: SUBROUTINE
FUNCTION TYPE: VOID ()
SOURCE FILE: VT100
SOURCE FILE TYPE: .C
HOST:
SUBSYSTEM: UI
SUBDIRECTORY: DEVDRV
DOCUMENTATION GROUP: VIRTERM

DESCRIPTION:

SYNOPSIS

```
VOID TRMPUT(CMD)
   STRUCT COMMAND *CMD;
```

DESCRIPTION

PUTS AN INTERNAL FORMAT COMMAND TO THE TERMINAL.

ARGUMENTS:

CMD = STRUCT COMMAND *

INCLUDE FILES:

STDIO	- **** PURPOSE NOT FOUND BY STRIPPER ****
STDTYP	- STANDARD TYPE DEFINITIONS
CTYPE	- **** PURPOSE NOT FOUND BY STRIPPER ****
TERMIO	- TRANSPARENT TERMINAL I/O DEFINITIONS
BITS	- INCLUDE FILE FOR BIT MANIPULATION ROUTINES
SCREEN	- INTERNAL SCREEN DEFINITIONS
FUNCTS	- FUNCTION DEFINITIONS
TRMRTN	- TERMINAL (DEVICE DRIVER) ROUTINES
CI600.C"	- **** PURPOSE NOT FOUND BY STRIPPER ****

ROUTINES CALLED:

GETCHAR	
PRINTF	
PRNFLS	
PRNPUT	
REFTERM	- REFRESH TERMINAL
TPUTNUM	- TERMINAL PUT NUMBER
POS	
TPUTS	- TERMINAL PUT STRING
REFRESH	- REFRESH TERMINAL
ROW	
COL	
TPUTC	

VT100/SETATR - SET ATTRIBUTES (INTERNAL)
SBIT
FFBSA
CABIT
FFBDA
VT100/MOVCUR - MOVE CURSOR (INTERNAL)
TBIT

CALLED DIRECTLY BY:

PRCCMDS	- PROCESS COMMAND
REFRESH	- REFRESH TERMINAL
REFTERM	- REFRESH TERMINAL
TRMGET	- TERMINAL GET

USED IN MAIN PROGRAM(S):

DRIVER/MAI - MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER

VIRTUAL TERMINAL Module Documentation

NAME: TRMVT
PURPOSE: TERMINATE VIRTUAL TERMINAL
LANGUAGE: C
MODULE TYPE: SUBROUTINE
FUNCTION TYPE: VOID ()
SOURCE FILE: TRMVT
SOURCE FILE TYPE: .C
HOST:
SUBSYSTEM: UI
SUBDIRECTORY: DRIVER
DOCUMENTATION GROUP: VIRTERM

DESCRIPTION:

SYNOPSIS
VOID TRMVT()

DESCRIPTION
CLOSES THE VTI.

INCLUDE FILES:

STDTYP	- STANDARD TYPE DEFINITIONS
BITS	- INCLUDE FILE FOR BIT MANIPULATION ROUTINES
SCREEN	- INTERNAL SCREEN DEFINITIONS
FUNCTS	- FUNCTION DEFINITIONS
CTLCHR	- CONTROL CHARACTERS
TRMRTN	- TERMINAL (DEVICE DRIVER) ROUTINES

ROUTINES CALLED:

TRMEND	- TERMINAL END
FREE	
PUTVT	- PUT DATA TO VIRTUAL TERMINAL

CALLED DIRECTLY BY:

DRIVER/MAI	- MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER
TVTPRC	- TERMINATE VTI PROCESS

USED IN MAIN PROGRAM(S):

DRIVER/MAI - MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER

VIRTUAL TERMINAL Module Documentation

NAME: TVTPRC
PURPOSE: TERMINATE VTI PROCESS
LANGUAGE: C
MODULE TYPE: SUBROUTINE
FUNCTION TYPE: VOID ()
SOURCE FILE: TVTPRC
SOURCE FILE TYPE: .C
HOST:
SUBSYSTEM: UI
SUBDIRECTORY: DRIVER
DOCUMENTATION GROUP: VIRTERM

DESCRIPTION:

SYNOPSIS
VOID TVTPRC()

DESCRIPTION
THIS IS AN EXIT HANDLER FOR ABNORMAL TERMINATIONS

INCLUDE FILES:

STDTYP - STANDARD TYPE DEFINITIONS

ROUTINES CALLED:

TRMNAT
TRMVT - TERMINATE VIRTUAL TERMINAL
EXIT

CALLED DIRECTLY BY:

DRIVER/MAI - MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER
FATAL - REPORT FATAL ERROR

USED IN MAIN PROGRAM(S):

DRIVER/MAI - MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER

VIRTUAL TERMINAL Module Documentation

NAME: VT100/MOVCUR
PURPOSE: MOVE CURSOR (INTERNAL)
LANGUAGE: C
MODULE TYPE: SUBROUTINE
FUNCTION TYPE: VOID ()
SOURCE FILE: VT100
SOURCE FILE TYPE: .C
HOST:
SUBSYSTEM: UI
SUBDIRECTORY: DEVDRV
DOCUMENTATION GROUP: VIRTERM

DESCRIPTION:

SYNOPSIS

```
STATIC VOID MOVCUR(NEWPOS)
   INT NEWPOS;
```

DESCRIPTION

MOVES THE TERMINAL CURSOR TO THE SPECIFIED POSITION AND RESETS ANY PENDING POSITION.

ARGUMENTS:

NEWPOS = INT

INCLUDE FILES:

STDIO	- **** PURPOSE NOT FOUND BY STRIPPER ****
STDTYP	- STANDARD TYPE DEFINITIONS
CTYPE	- **** PURPOSE NOT FOUND BY STRIPPER ****
TERMIO	- TRANSPARENT TERMINAL I/O DEFINITIONS
BITS	- INCLUDE FILE FOR BIT MANIPULATION ROUTINES
SCREEN	- INTERNAL SCREEN DEFINITIONS
FUNCTS	- FUNCTION DEFINITIONS
TRMRTN	- TERMINAL (DEVICE DRIVER) ROUTINES
CI600.C"	- **** PURPOSE NOT FOUND BY STRIPPER ****

ROUTINES CALLED:

TPUTC	
TPUTNUM	- TERMINAL PUT NUMBER
TPUTS	- TERMINAL PUT STRING
COL	
ROW	

CALLED DIRECTLY BY:

TRMPUT	- TERMINAL PUT
TRMFLS	- TERMINAL FLUSH

USED IN MAIN PROGRAM(S):

DRIVER/MAI - MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER

VIRTUAL TERMINAL Module Documentation

```
NAME:                   VT100/SETATR
PURPOSE:                SET ATTRIBUTES (INTERNAL)
LANGUAGE:               C
MODULE TYPE:            SUBROUTINE
FUNCTION TYPE:          VOID ()
SOURCE FILE:            VT100
SOURCE FILE TYPE:       .C
HOST:
SUBSYSTEM:              UI
SUBDIRECTORY:           DEVDRV
DOCUMENTATION GROUP:    VIRTERM
```

DESCRIPTION:

SYNOPSIS

```
VOID SETATR(ATR)
   INT ATR;
```

DESCRIPTION

SETS THE SPECIFIED TERMINAL ATTRIBUTES.

ARGUMENTS:

ATR =	INT

INCLUDE FILES:

STDIO	- **** PURPOSE NOT FOUND BY STRIPPER ****
STDTYP	- STANDARD TYPE DEFINITIONS
CTYPE	- **** PURPOSE NOT FOUND BY STRIPPER ****
TERMIO	- TRANSPARENT TERMINAL I/O DEFINITIONS
BITS	- INCLUDE FILE FOR BIT MANIPULATION ROUTINES
SCREEN	- INTERNAL SCREEN DEFINITIONS
FUNCTS	- FUNCTION DEFINITIONS
TRMRTN	- TERMINAL (DEVICE DRIVER) ROUTINES
CI600.C"	- **** PURPOSE NOT FOUND BY STRIPPER ****

ROUTINES CALLED:

TPUTNUM	- TERMINAL PUT NUMBER
TPUTC	
FFBSA	
TPUTS	- TERMINAL PUT STRING

CALLED DIRECTLY BY:

TRMPUT	- TERMINAL PUT

USED IN MAIN PROGRAM(S):

DRIVER/MAI - MAIN MODULE FOR WINDOW MANAGER AND DEVICE DRIVER

3.10.9 Include File Descriptions

The following list contains a purpose and description of each include file listed in 3.10.4 as specified in the source code. The language it is written in is also given.

VIRTUAL TERMINAL Include File Description

FILE NAME: BITS
PURPOSE: INCLUDE FILE FOR BIT MANIPULATION ROUTINES
LANGUAGE: C

DESCRIPTION:

VIRTUAL TERMINAL Include File Description

FILE NAME: CTLCHR
PURPOSE: CONTROL CHARACTERS
LANGUAGE: C

DESCRIPTION:

DESCRIPTION
DEFINITIONS OF ALL CONTROL CHARACTERS TO AVOID CHARACTER SET
DEPENDENCIES.

VIRTUAL TERMINAL Include File Description

FILE NAME: DEVICE
PURPOSE: PHYSICAL DEVICE DATA STRUCTURE
LANGUAGE: C

DESCRIPTION:

DESCRIPTION
THIS IS INCLUDE FILE FOR WINDOW MANAGER. IT CONTIANS DATA STRUCTURE
FOR THE PHYSICAL DEVICE AND ITS LOGICAL DEVICES AND WINDOWS.

VIRTUAL TERMINAL Include File Description

FILE NAME: DEVINI
PURPOSE: DEVICE INITIALIZATIONS
LANGUAGE: C

DESCRIPTION:

DESCRIPTION
EXTERNAL DEFINITION AND INITIALIZING INCLUDE FILE FOR
DEVICE.H

VIRTUAL TERMINAL Include File Description

FILE NAME: FUNCTS
PURPOSE: FUNCTION DEFINITIONS
LANGUAGE: C

DESCRIPTION:

DESCRIPTION
DEFINES THE MNEMONIC VIRTUAL TERMINAL COMMAND FUNCTIONS.
AND DEFINES STRUCTURE FOR PARSING VTI MESSAGE BUFFER.

VIRTUAL TERMINAL Include File Description

FILE NAME: NTM
PURPOSE: NTM INTERFACE INCLUDE FILE
LANGUAGE: C

DESCRIPTION:

DESCRIPTION
INCLUDE FILE FOR NTM INTERFACE

VIRTUAL TERMINAL Include File Description

```
ABS(A)          - ABSOLUTE VALUE OF A
STRASN(A, B)    - TRANSPORTABLE A = B FOR STRUCTURES
NULL            - NULL POINTER VALUE (0)
TRUE            - 1
FALSE           - 0
SUCCESS         - EXIT(SUCCESS) INDICATES SUCCESSFUL
                  COMPLETION
FAILURE         - EXIT(FAILURE) INDICATES ERRORS

THE FOLLOWING SYMBOLS SHOULD BE DEFINED BASED ON THE
                  COMPILER BEING USED:
USHORT  - COMPILER SUPPORTS UNSIGNED SHORT
TINY    - COMPILER TREATS CHAR AS SIGNED
UTINY   - CHAR IS SIGNED AND COMPILER SUPPORTS
                  UNSIGNED CHAR
VOID    - COMPILER SUPPORTS VOID
FORTRAN - COMPILER SUPPORTS FORTRAN
STRASN  - DEFINE APPROPRIATE MACRO
SUCCESS - DEFINE APPROPRIATE VALUE IF NOT 0
FAILURE - DEFINE APPROPRIATE VALUE IF NOT 1
```

VIRTUAL TERMINAL Include File Description

FILE NAME: TERMIO
PURPOSE: TRANSPARENT TERMINAL I/O DEFINITIONS
LANGUAGE: C

DESCRIPTION:

VIRTUAL TERMINAL Include File Description

FILE NAME: TRMRTN
PURPOSE: TERMINAL (DEVICE DRIVER) ROUTINES
LANGUAGE: C

DESCRIPTION:

DESCRIPTION
DECLARATIONS FOR ALL TRM* DEVICE SPECIFIC DEVICE DRIVER ROUTINES.

3.10.10 Hierarchy Chart

The following hierarchy charts show the relationships between all of the modules mentioned in the above documentation. A module may call a subroutine several times within its code, but the call will only be shown once as a single relationship on this hierarchy chart. All modules shown at the top of the first page are considered Main Programs as described in section 3.10.1 above.

There is an internal paging scheme as marked by the numbers in the upper right corner of each page. An index after the last page of the chart shows where a routine and its calls are first defined. If a routine has no page reference, it either makes no calls or is an external routine. A continuation box on the end of a tree limb shows where that the tree continues on the page numbered mentioned. A number in a box with a routine name points to the page where the routine is further defined within the hierarchy tree. If there is no number in a box, the routine either makes no calls or is an external routine.

VIRTUAL TERMINAL Include File Description

FILE NAME: SCREEN
PURPOSE: INTERNAL SCREEN DEFINITIONS
LANGUAGE: C

DESCRIPTION:

DESCRIPTION
DEFINES SYMBOLS, EXTERNALS, ETC. FOR THE INTERNAL SCREEN BUFFER.

VIRTUAL TERMINAL Include File Description

FILE NAME: STDTYP
PURPOSE: STANDARD TYPE DEFINITIONS
LANGUAGE: C

DESCRIPTION:

DESCRIPTION
THIS FILE ENSURES THAT THE FOLLOWING STANDARD TYPES ARE AVAILABLE:

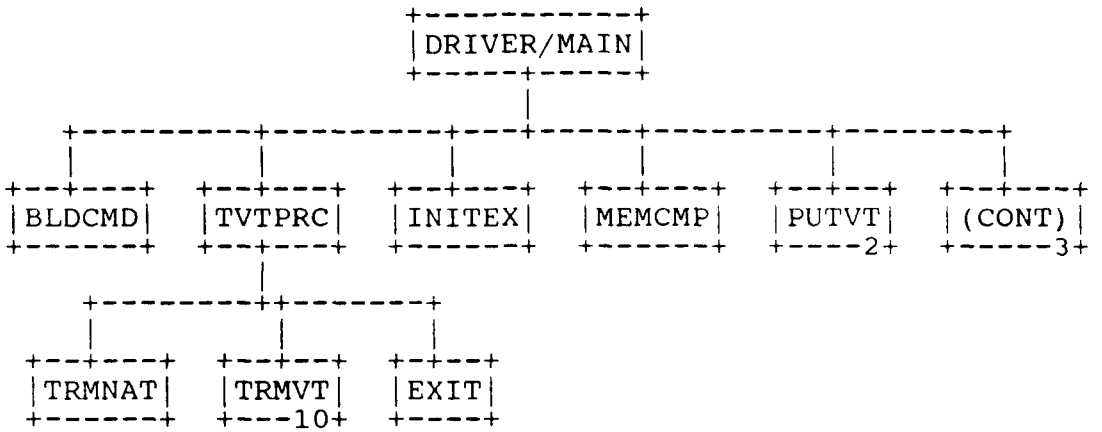
FLOAT	- SINGLE PRECISION FLOAT
DOUBLE	- DOUBLE PRECISION FLOAT
LONG	- 32 BIT (OR LARGER) SIGNED INTEGER
LBITS	- 32 BITS (OR MORE) FOR BIT MANIPULATION
INT	- NATURAL SIZE SIGNED INTEGER
UNSIGNED	- NATURAL SIZE UNSIGNED INTEGER
BOOL	- NATURAL SIZE LOGICAL (ZERO / NON-ZERO ONLY)
SHORT	- 16 BIT (OR LARGER) SIGNED INTEGER
USHORT	- 16 BIT (OR LARGER) UNSIGNED INTEGER
BITS	- 16 BITS (OR MORE) FOR BIT MANIPULATION
CHAR	- SINGLE MACHINE CHARACTER (REAL CHARACTERS ALWAYS POSITIVE)
TINY	- 8 BIT (OR LARGER) SIGNED INTEGER
UTINY	- 8 BIT (OR LARGER) UNSIGNED INTEGER
TBITS	- 8 BITS (OR MORE) FOR BIT MANIPULATION
TBOOL	- 8 BIT (OR LARGER) LOGICAL (ZERO / NON-ZERO ONLY)
METACHAR	- 16 BIT (OR LARGER) AUGMENTED CHARACTER (SIGNED)
VOID	- FUNCTION THAT RETURNS NO VALUE
FORTRAN	- STORAGE CLASS FOR FOREIGN (NON-C) ROUTINES OR C ROUTINES WHICH ARE CALLABLE FROM FOREIGN ROUTINES

SINCE NOT ALL COMPILERS SUPPORT USHORT, TINY, AND UTINY, THE FUNCTIONS USHORT(), TINY(), AND UTINY() SHOULD BE USED WHENEVER REFERENCING THEM.

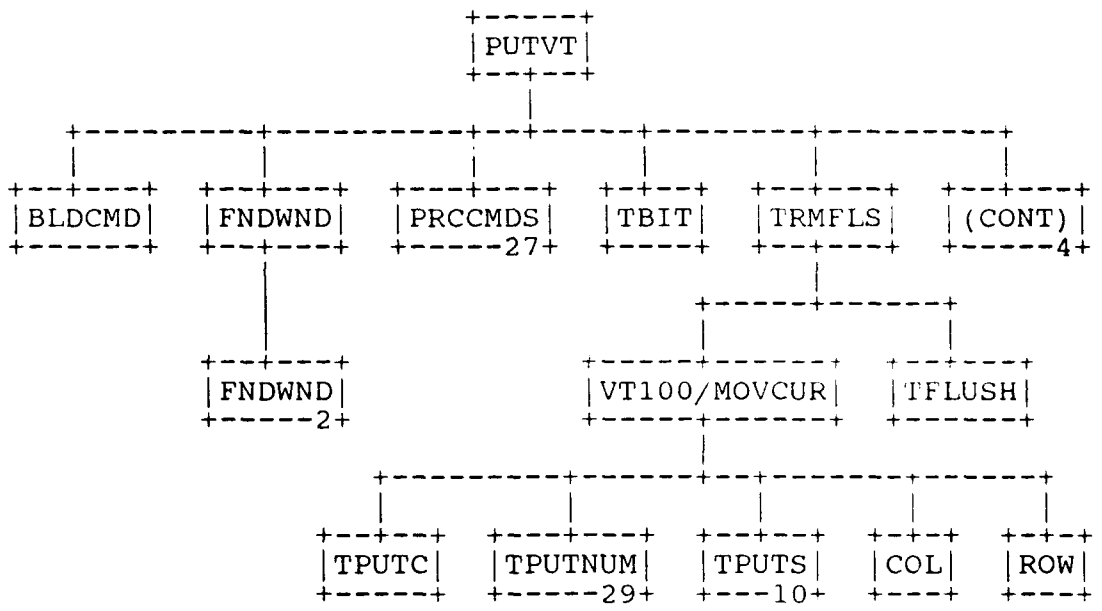
IN ADDITION, THE FOLLOWING UTILITY MACROS ARE DEFINED:

LURSHIFT(N, B)	- UNSIGNED LONG RIGHT SHIFT
MAX(A, B)	- MAXIMUM OF A AND B
MIN(A, B)	- MINIMUM OF A AND B

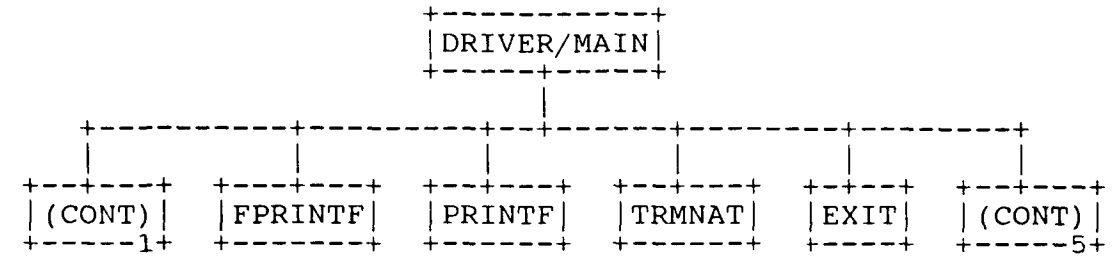
1


DRIVER/MAIN
BLDCMD
TVTPRC
INITEX
MEMCMP
PUTVT
(CONT)
2
3
TRMNAT
TRMVT
10
EXIT

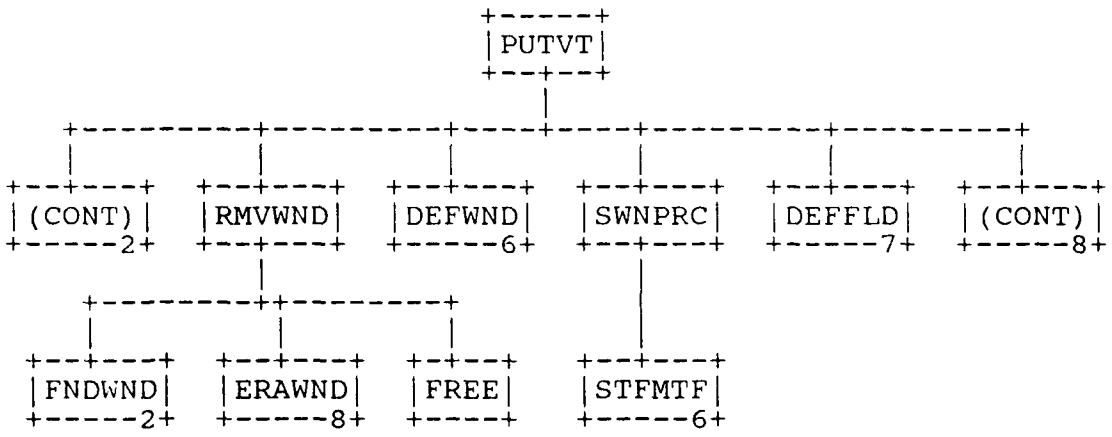
2


PUTVT
BLDCMD
FNDWND
PRCCMDS
27
TBIT
TRMFLS
(CONT)
4
FNDWND
2
VT100/MOVCUR
TFLUSH
TPUTC
TPUTNUM
29
TPUTS
10
COL
ROW

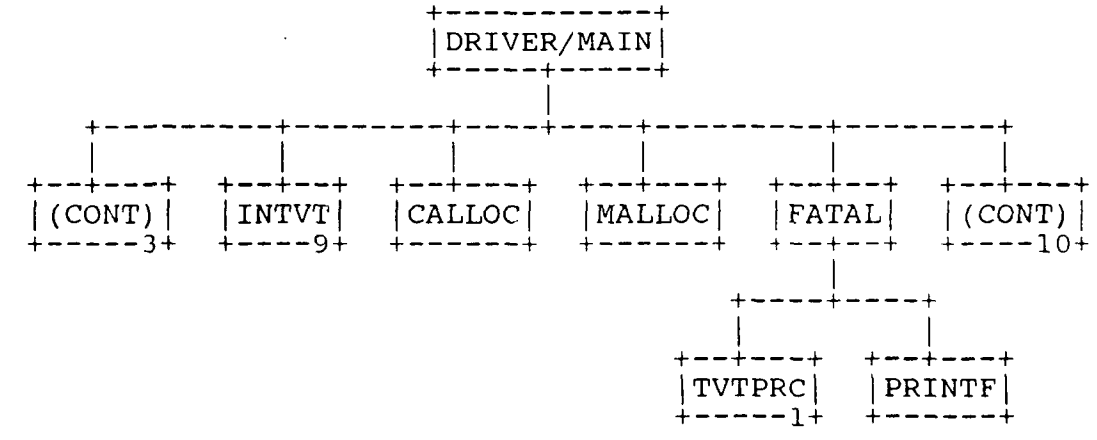
3


DRIVER/MAIN
(CONT)
1
FPRINTF
PRINTF
TRMNAT
EXIT
(CONT)
5

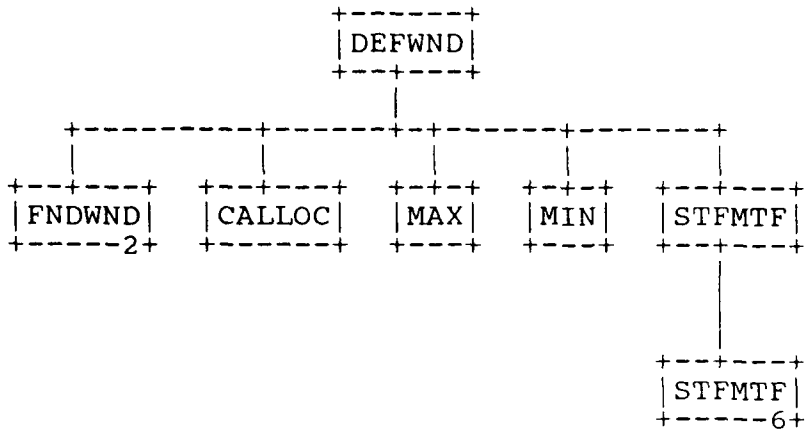
4


PUTVT
(CONT)
2
RMVWND
DEFWND
6
SWNPRC
DEFFLD
7
(CONT)
8
FNDWND
2
ERAWND
8
FREE
STFMTF
6

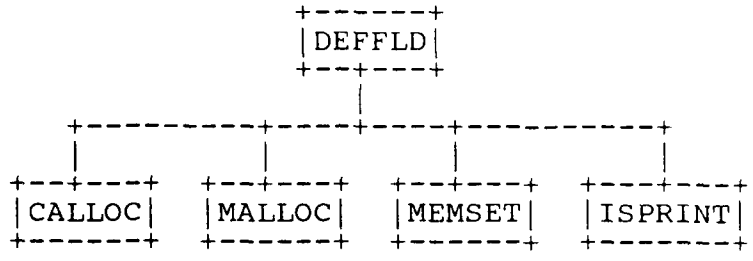
5


DRIVER/MAIN
(CONT)
3
INTVT
9
CALLOC
MALLOC
FATAL
(CONT)
10
TVTPRC
1
PRINTF

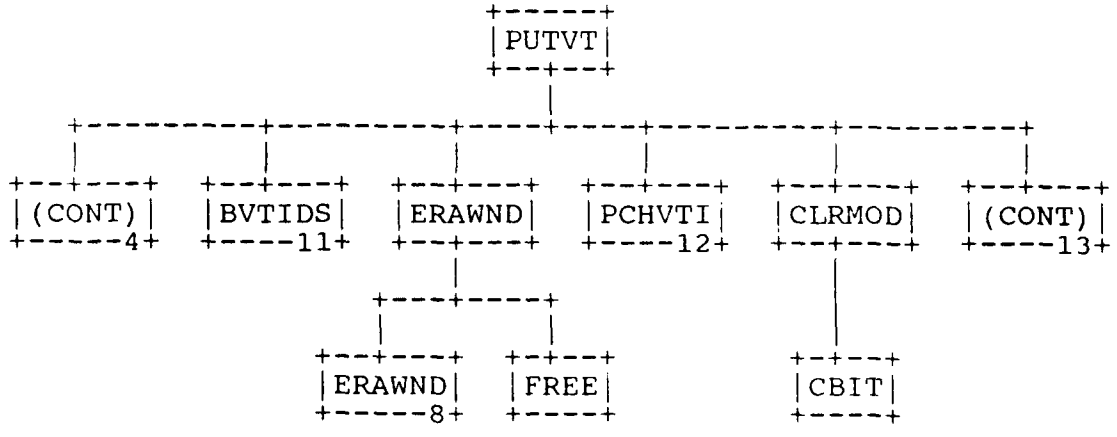
6


DEFWND
FNDWND
2
CALLOC
MAX
MIN
STFMTF
STFMTF
6

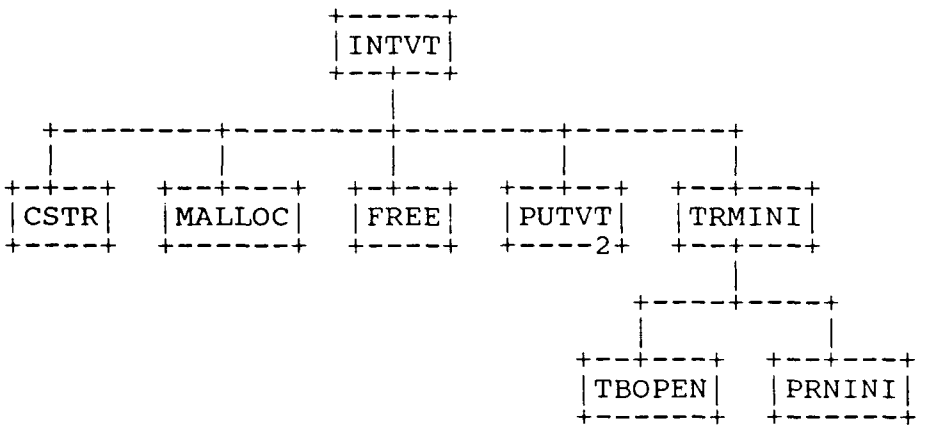
7


DEFFLD
CALLOC
MALLOC
MEMSET
ISPRINT

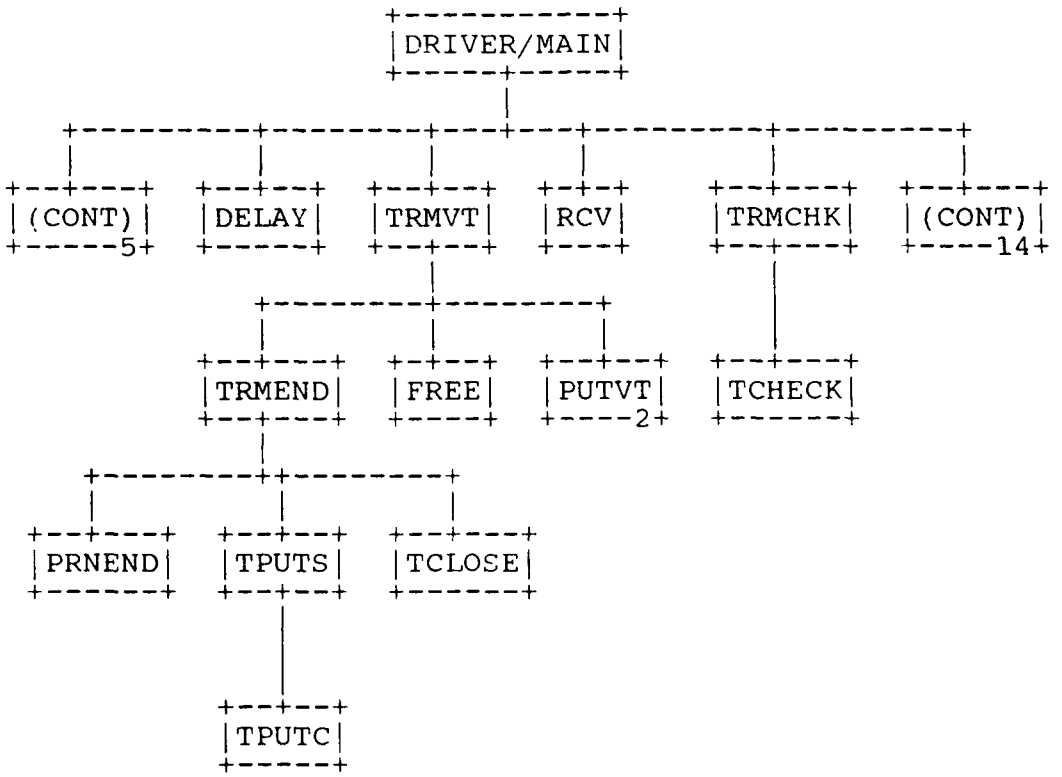
8


PUTVT
(CONT)
4
BVTIDS
11
ERAWND
PCHVTI
12
CLRMOD
(CONT)
13
ERAWND
8
FREE
CBIT

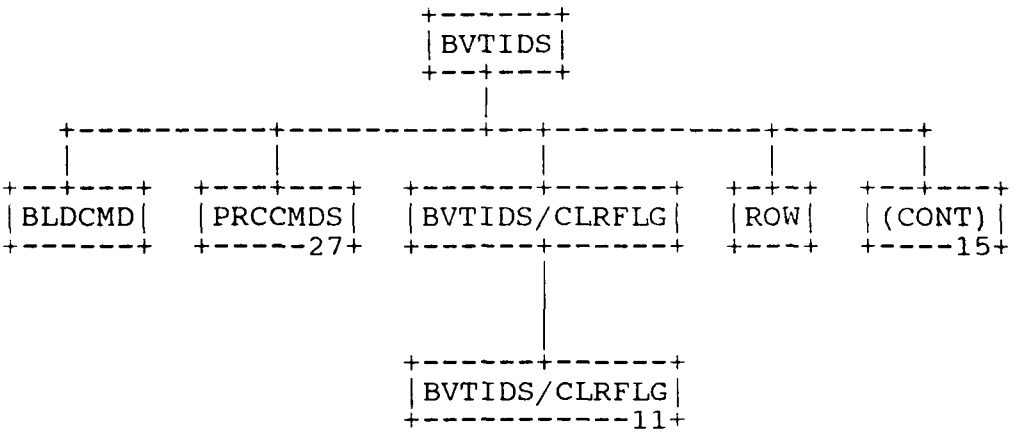
9


INTVT
CSTR
MALLOC
FREE
PUTVT
TRMINI
TBOPEN
PRNINI

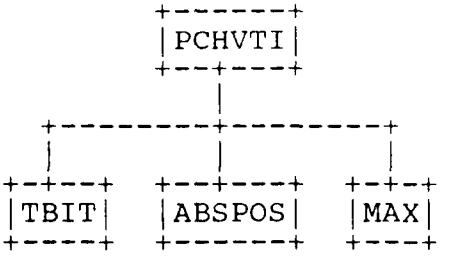
10


DRIVER/MAIN
(CONT)
DELAY
TRMVT
RCV
TRMCHK
(CONT)
TRMEND
FREE
PUTVT
TCHECK
PRNEND
TPUTS
TCLOSE
TPUTC

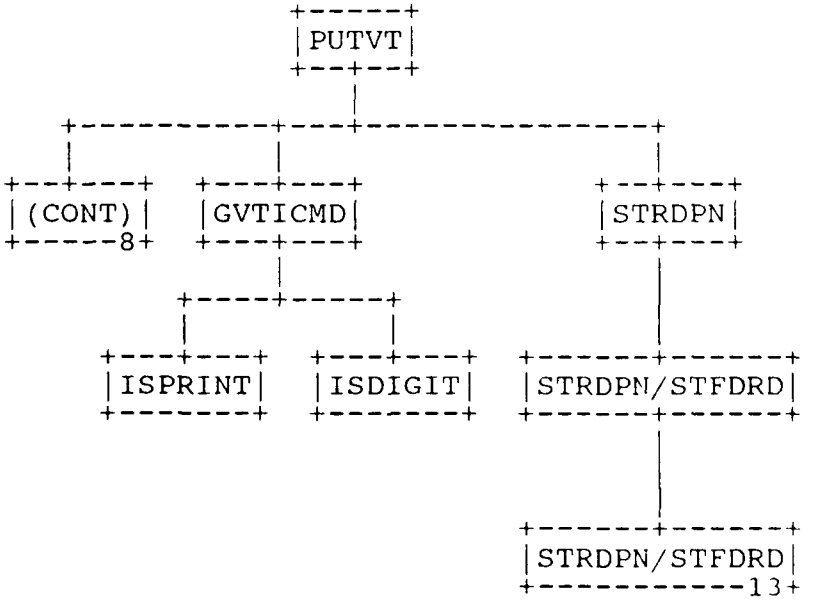
11


BVTIDS
BLDCMD
PRCCMDS
27
BVTIDS/CLRFLG
ROW
(CONT)
15
BVTIDS/CLRFLG
11

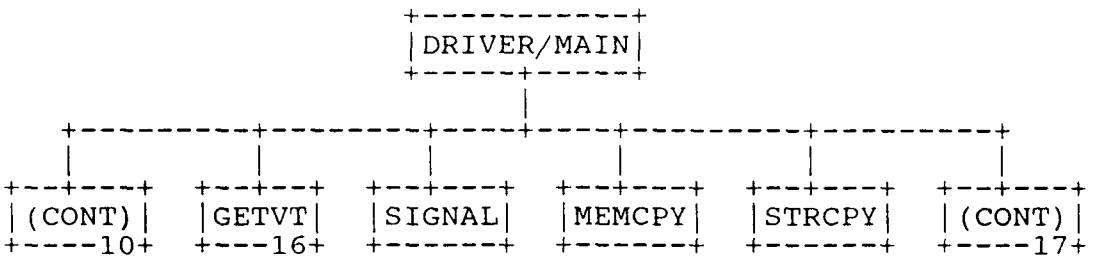
12


PCHVTI
TBIT
ABSPOS
MAX

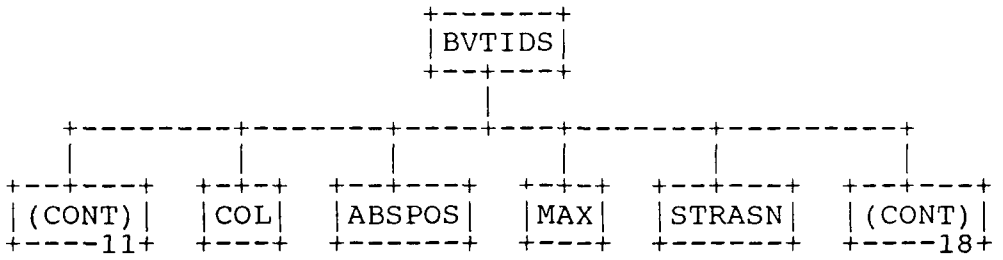
13


PUTVT
(CONT)
8
GVTICMD
STRDPN
ISPRINT
ISDIGIT
STRDPN/STFDRD
STRDPN/STFDRD
13

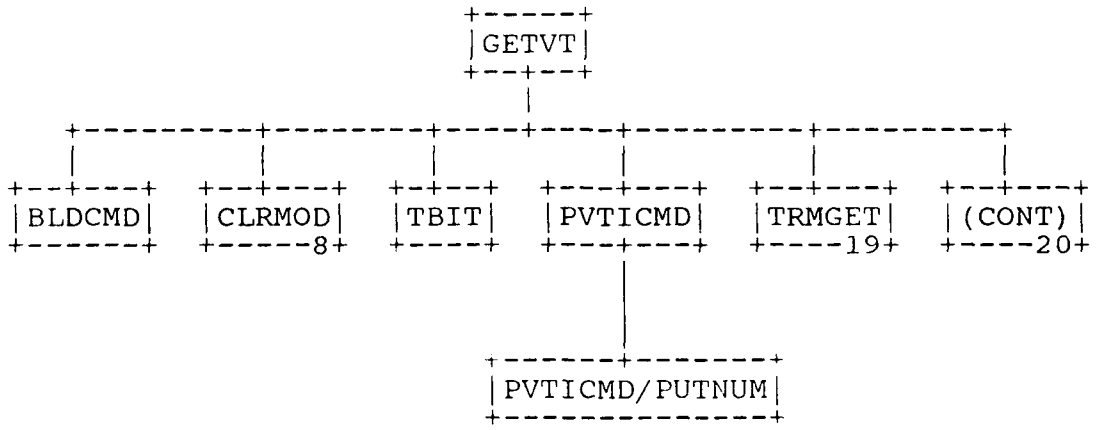
14


DRIVER/MAIN
(CONT)
10
GETVT
16
SIGNAL
MEMCPY
STRCPY
(CONT)
17

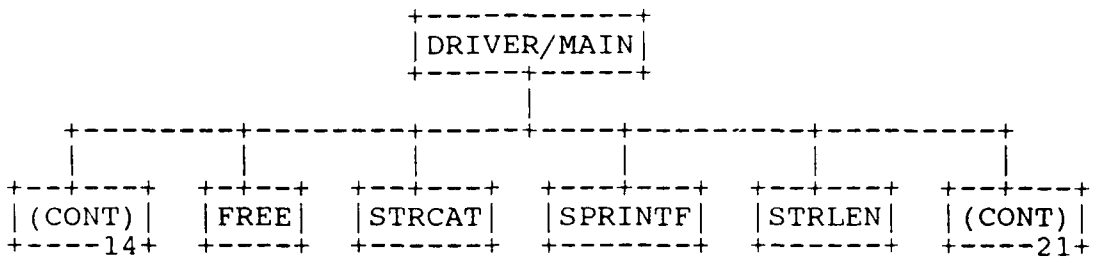
15


BVTIDS
(CONT)
11
COL
ABSPOS
MAX
STRASN
(CONT)
18

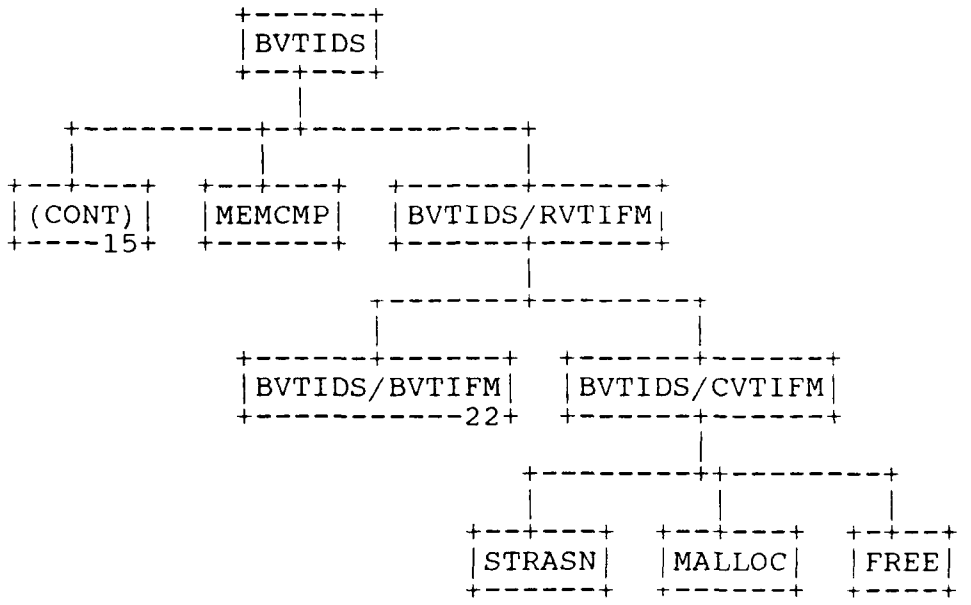
16


GETVT
BLDCMD
CLRMOD
8
TBIT
PVTICMD
TRMGET
19
(CONT)
20
PVTICMD/PUTNUM

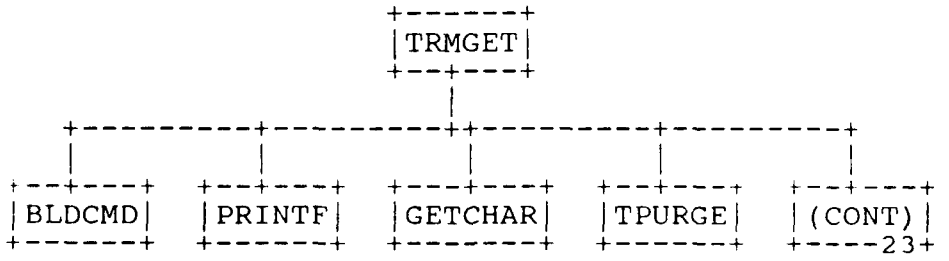
17


DRIVER/MAIN
(CONT)
14
FREE
STRCAT
SPRINTF
STRLEN
(CONT)
21

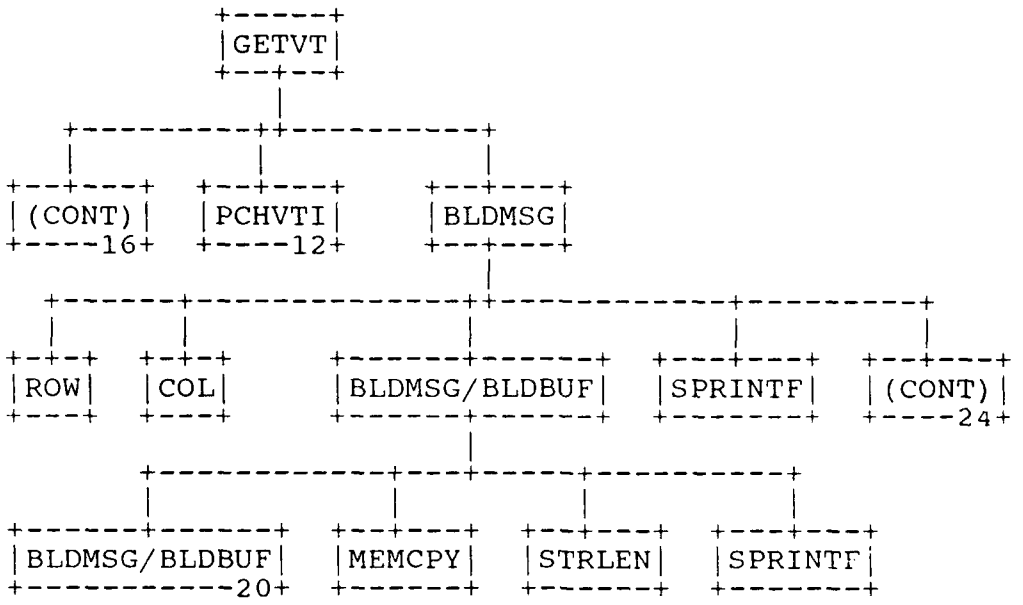
18


BVTIDS
(CONT)
15
MEMCMP
BVTIDS/RVTIFM
BVTIDS/BVTIFM
22
BVTIDS/CVTIFM
STRASN
MALLOC
FREE

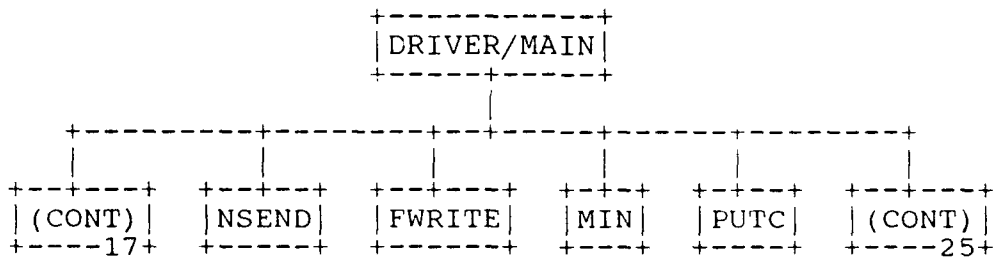
19


TRMGET
BLDCMD
PRINTF
GETCHAR
TPURGE
(CONT)
23

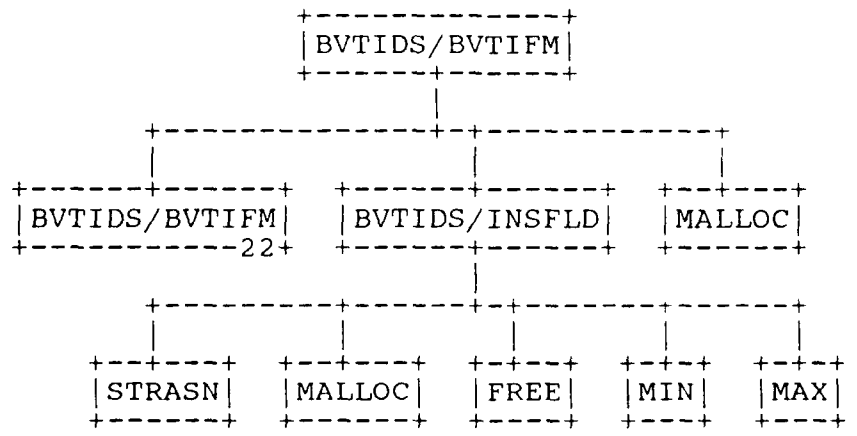
20


GETVT
(CONT)
16
PCHVTI
12
BLDMSG
ROW
COL
BLDMSG/BLDBUF
SPRINTF
(CONT)
24
BLDMSG/BLDBUF
20
MEMCPY
STRLEN
SPRINTF

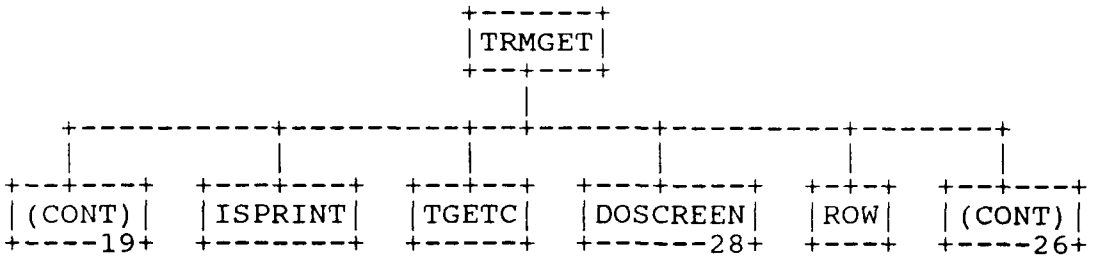
21


DRIVER/MAIN
(CONT)
17
NSEND
FWRITE
MIN
PUTC
(CONT)
25

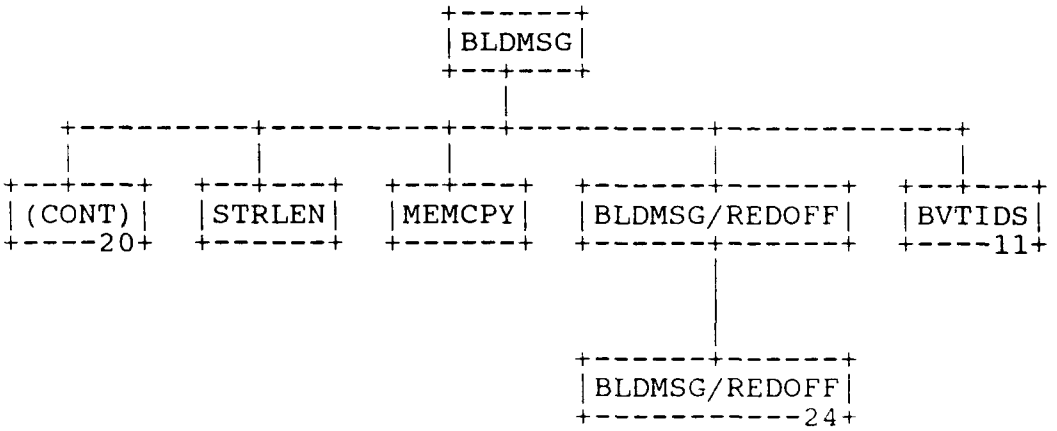
22


BVTIDS/BVTIFM
BVTIDS/BVTIFM
22
BVTIDS/INSFLD
MALLOC
STRASN
MALLOC
FREE
MIN
MAX

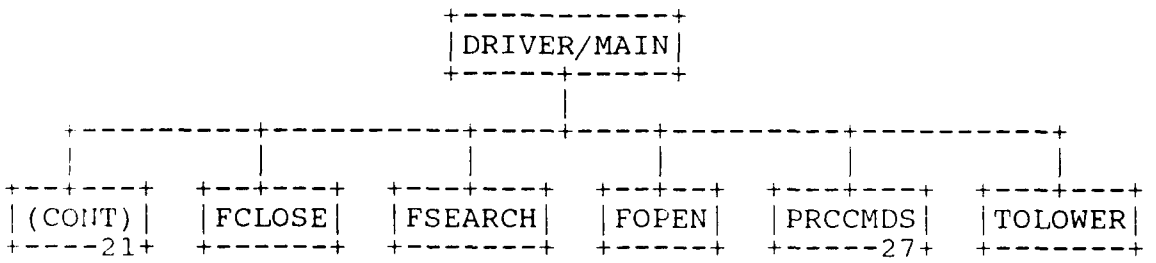
23


TRMGET
(CONT)
19
ISPRINT
TGETC
DOSCREEN
28
ROW
(CONT)
26

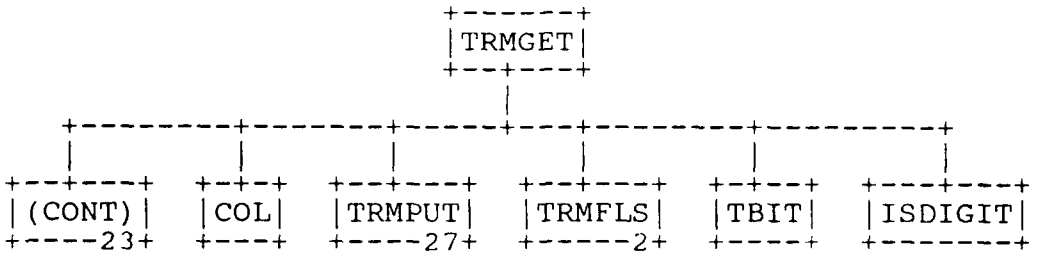
24


BLDMSG
(CONT)
20
STRLEN
MEMCPY
BLDMSG/REDOFF
BVTIDS
11
BLDMSG/REDOFF
24

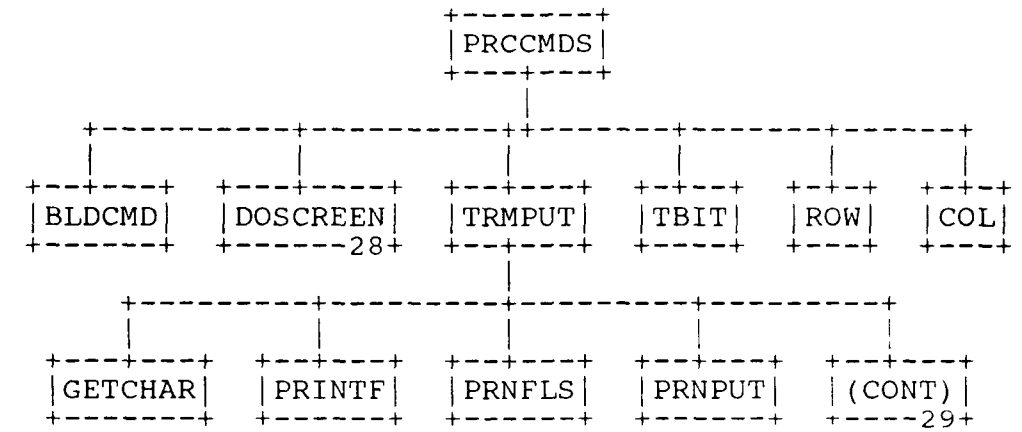
25


DRIVER/MAIN
(CONT)
21
FCLOSE
FSEARCH
FOPEN
PRCCMDS
27
TOLOWER

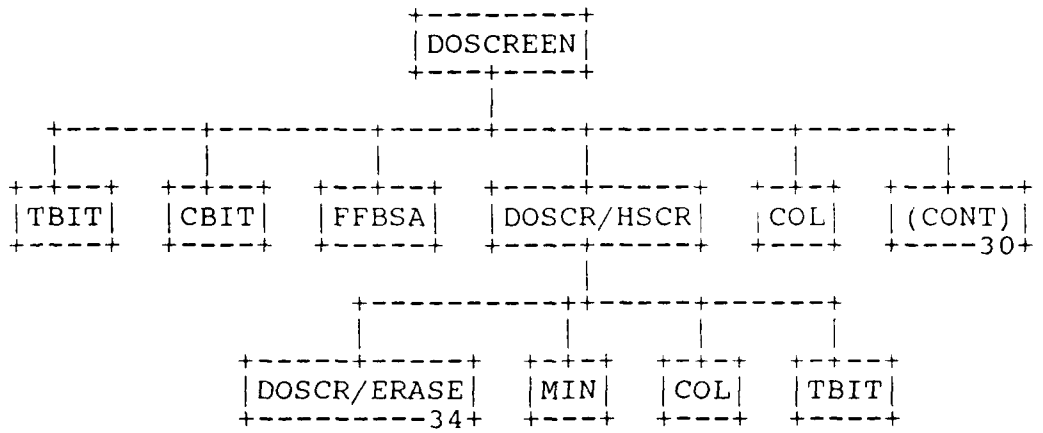
26


TRMGET
(CONT)
23
COL
TRMPUT
27
TRMFLS
2
TBIT
ISDIGIT

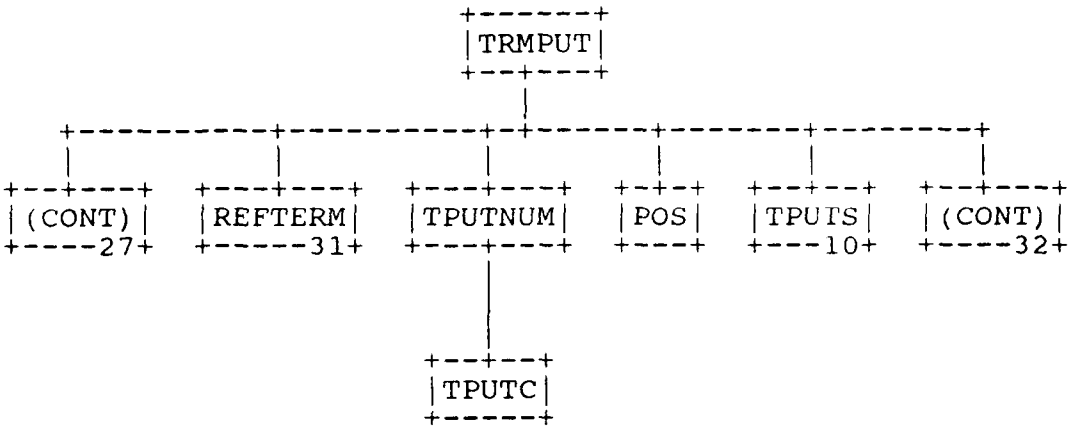
27


PRCCMDS
BLDCMD
DOSCREEN
28
TRMPUT
TBIT
ROW
COL
GETCHAR
PRINTF
PRNFLS
PRNPUT
(CONT)
29

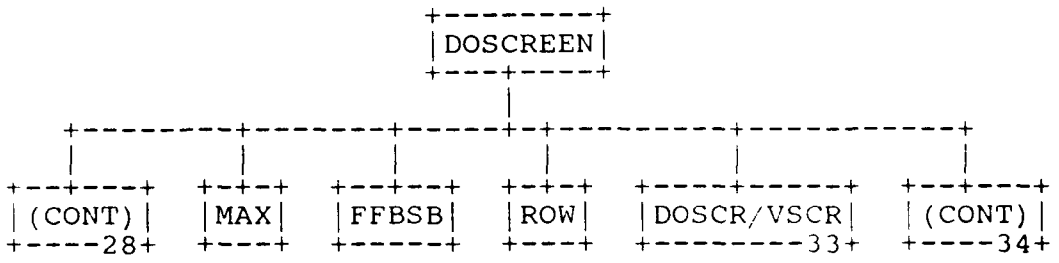
28


DOSCREEN
TBIT
CBIT
FFBSA
DOSCR/HSCR
COL
(CONT)
30
DOSCR/ERASE
34
MIN
COL
TBIT

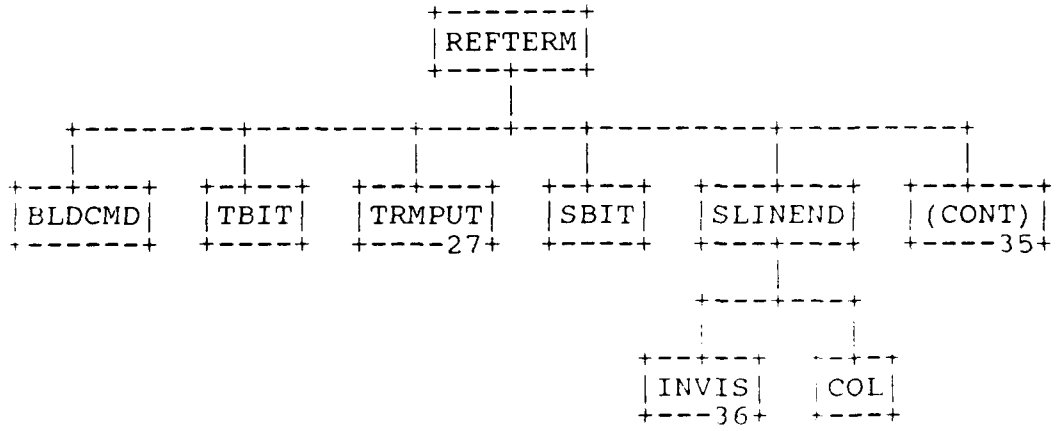
29


TRMPUT
(CONT)
27
REFTERM
31
TPUTNUM
POS
TPUTS
10
(CONT)
32
TPUTC

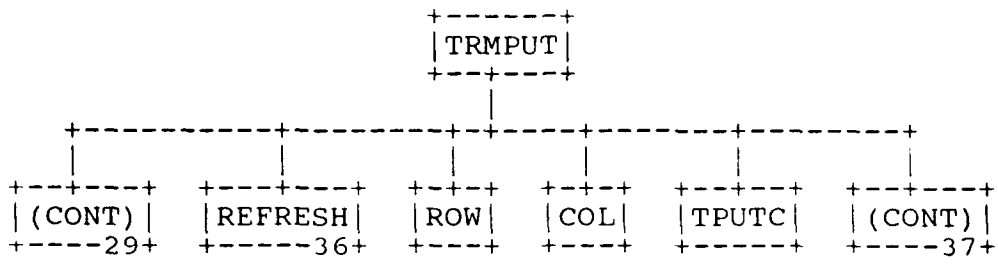
30


DOSCREEN
(CONT)
28
MAX
FFBSB
ROW
DOSCR/VSCR
33
(CONT)
34

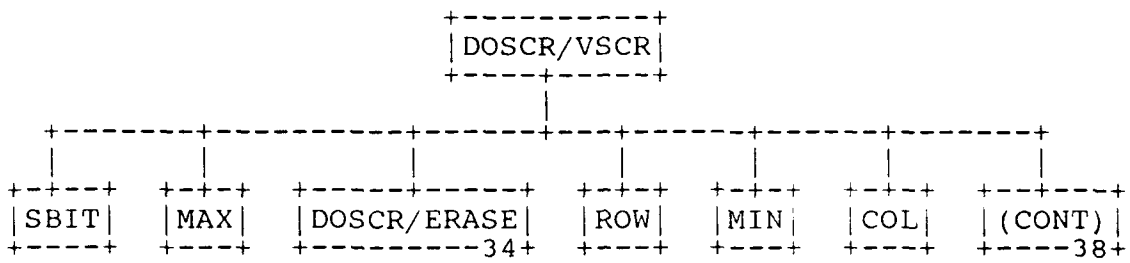
31


REFTERM
BLDCMD
TBIT
TRMPUT
27
SBIT
SLINEND
(CONT)
35
INVIS
36
COL

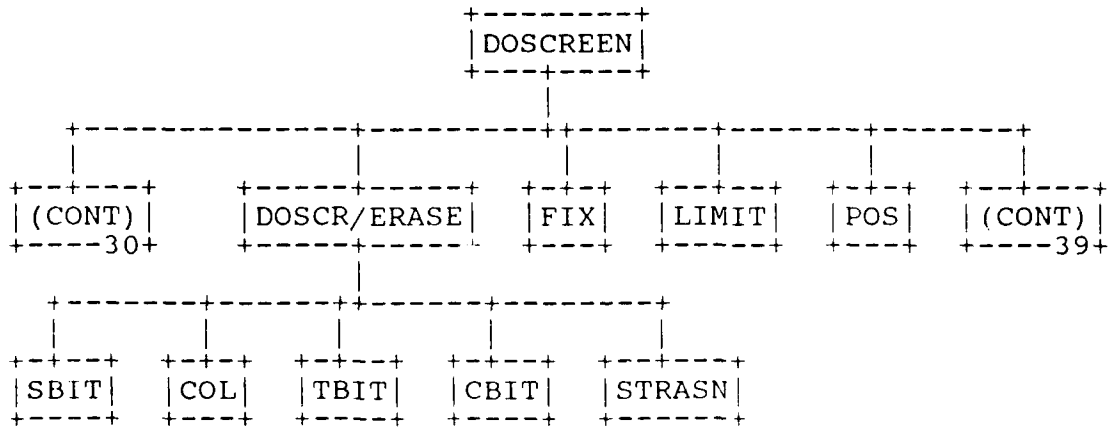
32


TRMPUT
(CONT)
29
REFRESH
36
ROW
COL
TPUTC
(CONT)
37

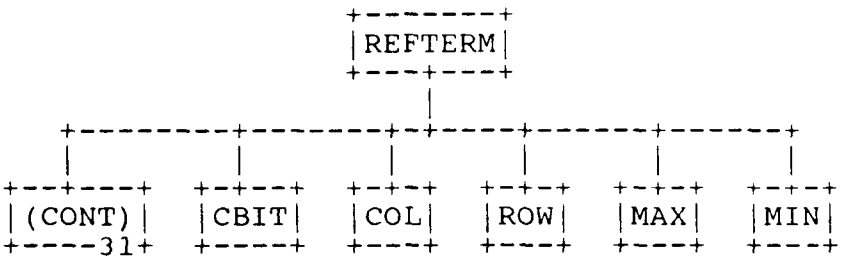
33


DOSCR/VSCR
SBIT
MAX
DOSCR/ERASE
34
ROW
MIN
COL
(CONT)
38

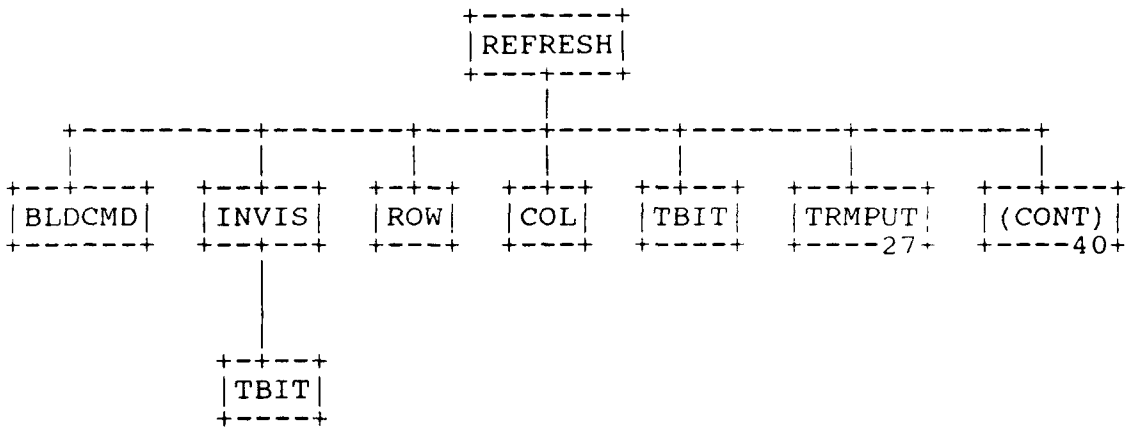
34


DOSCREEN
(CONT)
30
DOSCR/ERASE
FIX
LIMIT
POS
(CONT)
39
SBIT
COL
TBIT
CBIT
STRASN

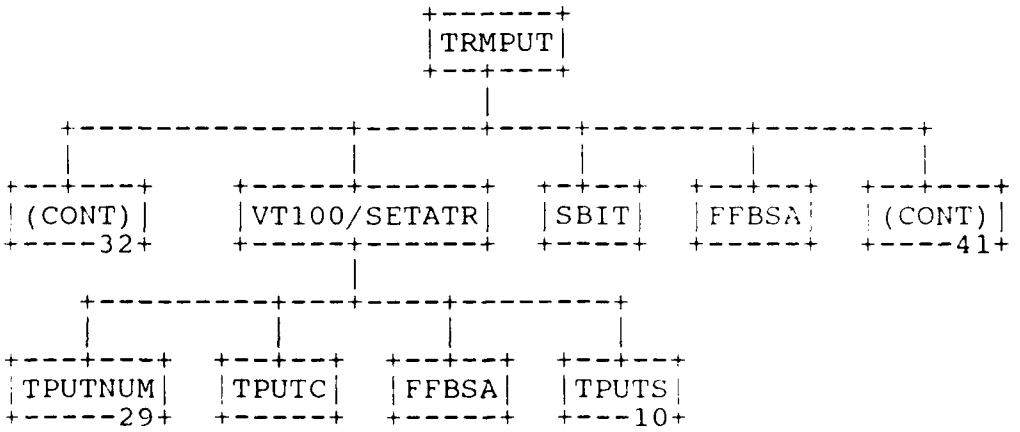
35


REFTERM
(CONT)
31
CBIT
COL
ROW
MAX
MIN

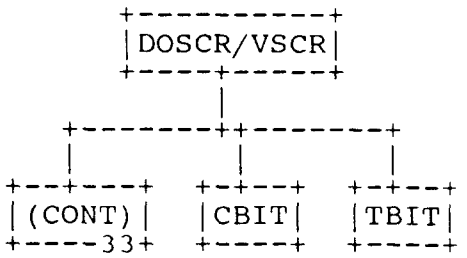
36


REFRESH
BLDCMD
INVIS
ROW
COL
TBIT
TRMPUT
27
(CONT)
40
TBIT

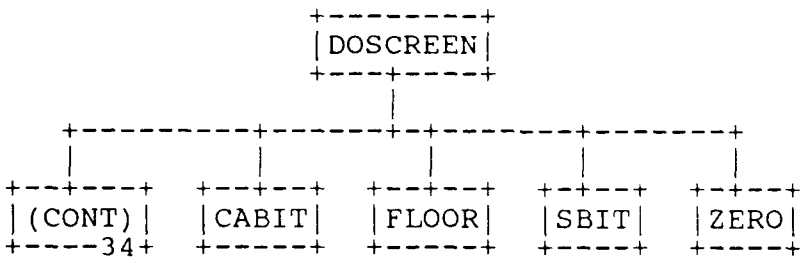
37


TRMPUT
(CONT)
32
VT100/SETATR
SBIT
FFBSA
(CONT)
41
TPUTNUM
29
TPUTC
FFBSA
TPUTS
10

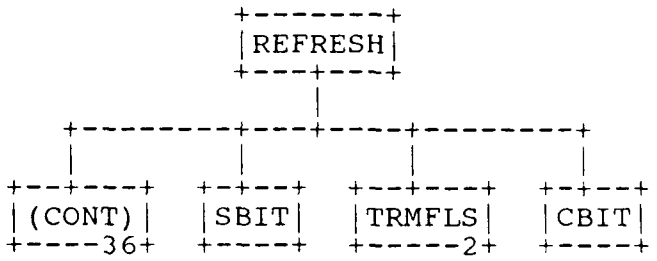
38


DOSCR/VSCR
(CONT)
33
CBIT
TBIT

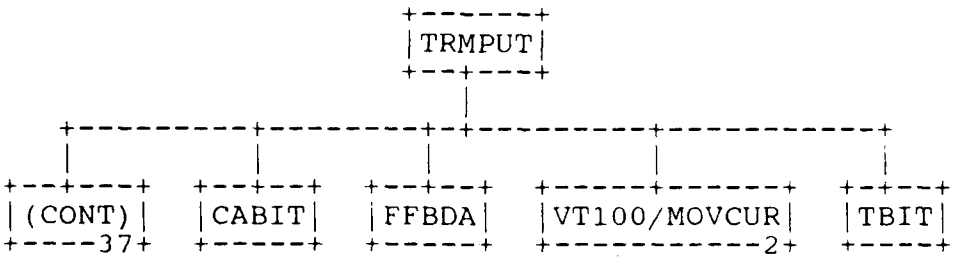
39


DOSCREEN
(CONT)
34
CABIT
FLOOR
SBIT
ZERO

40


REFRESH
(CONT)
36
SBIT
TRMFLS
2
CBIT

41


TRMPUT
(CONT)
37
CABIT
FFBDA
VT100/MOVCUR
2
TBIT

3.11 Program Listings Comments

This information is contained in the Module Descriptions in section 3.10.

SECTION 4

QUALITY ASSURANCE PROVISIONS

4.1 Introduction and Definitions

"Testing" is a systematic process that may be preplanned and explicitly stated. Test techniques and procedures may be defined in advance, and a sequence of test steps may be specified. "Debugging" is the process of isolation and correction of the cause of an error.

"Antibugging" is defined as the philosophy of writing programs in such a way as to make bugs less likely to occur and when they do occur, to make them more noticeable to the programmer and the user. In other words, as much error checking as is practical and possible in each routine should be performed.

4.2 Computer Programming Test and Evaluation

The quality assurance provisions for test consists of the normal testing techniques that are accomplished during the construction process. They consist of design and code walk-throughs, unit testing, and integration testing. These tests are performed by the design team. Structured design, design walk-through and the incorporation of "antibugging" facilitate this testing by exposing and addressing problem areas before they become coded "bugs."